IRANIAN RF-4E PHANTOMS The last of a dying breed

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Focussing on Iraq and Syria

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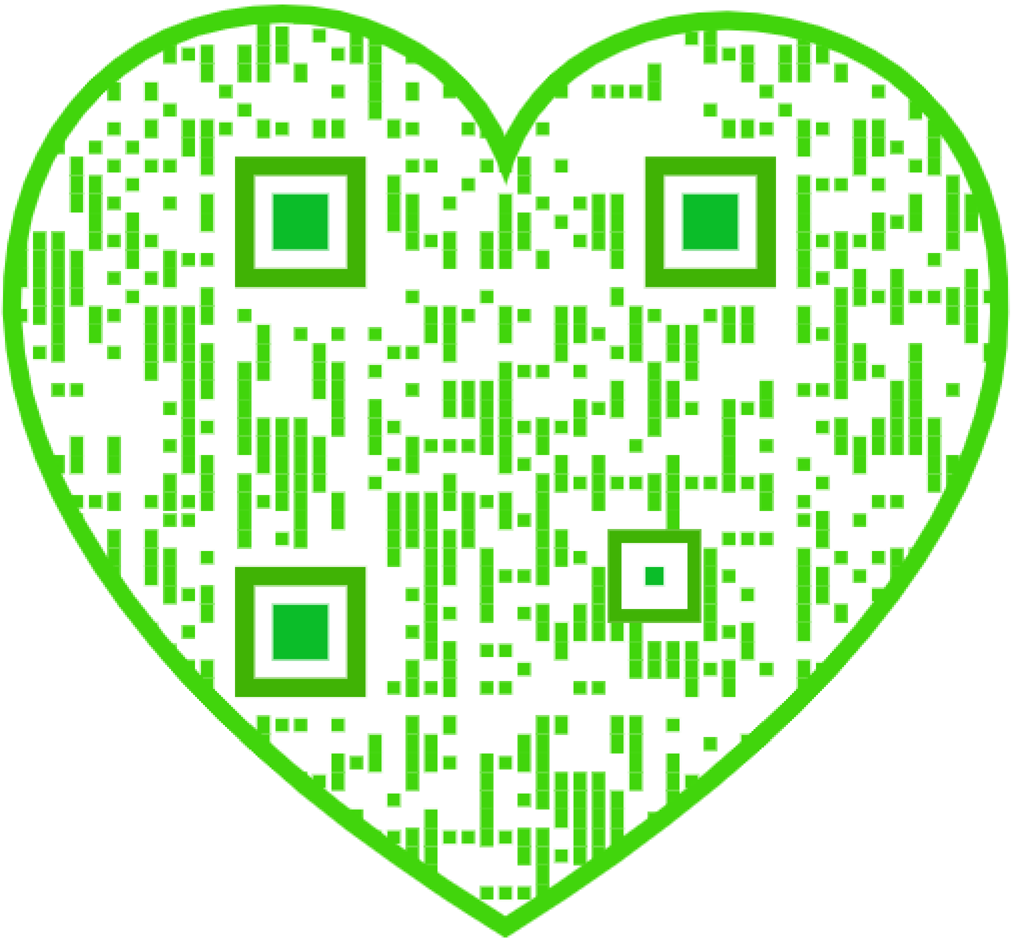

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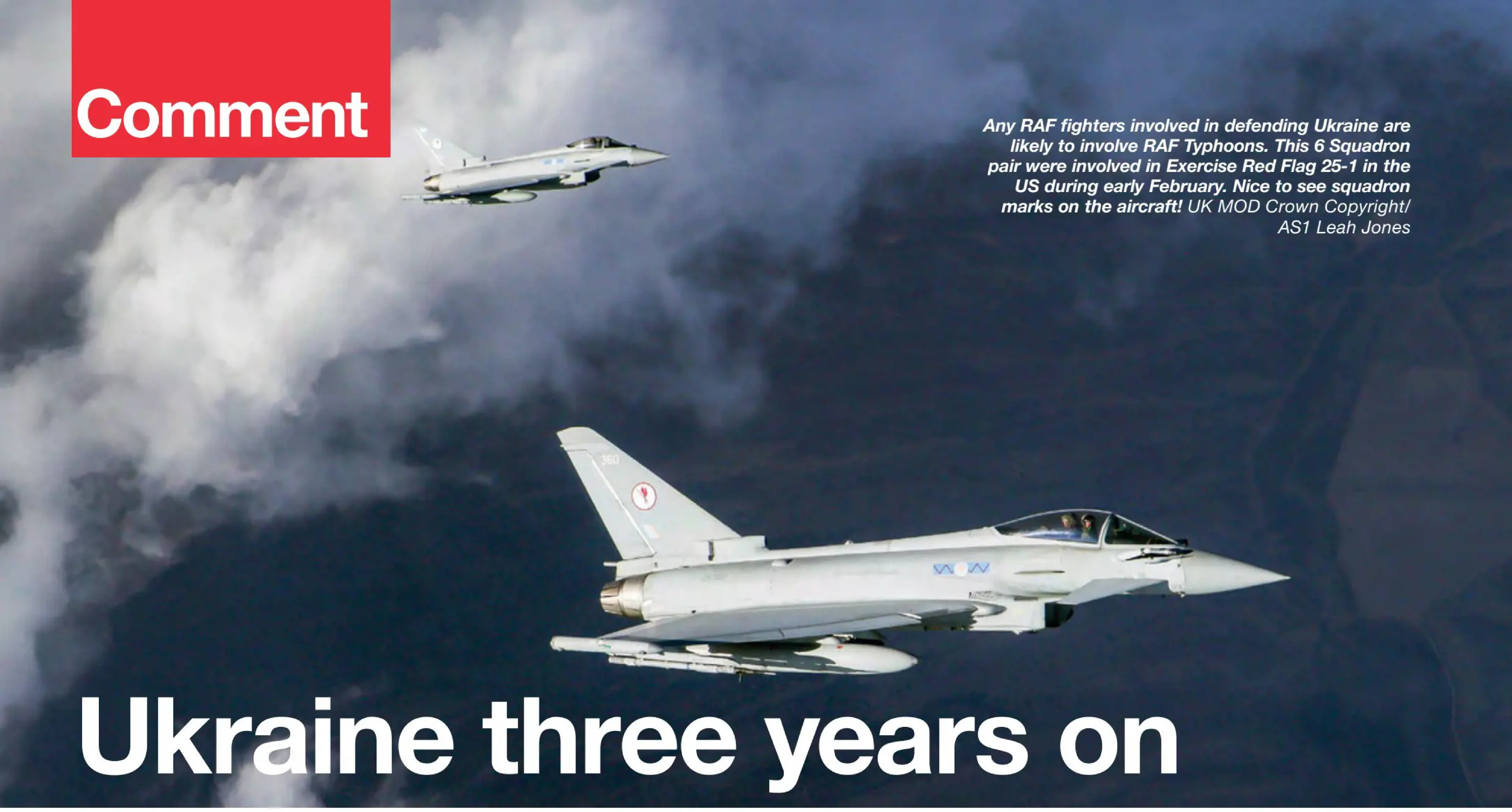


Any RAF fighters involved in defending Ukraine are likely to involve RAF Typhoons. This 6 Squadron pair were involved in Exercise Red Flag 25-1 in the US during early February. Nice to see squadron marks on the aircraft! UK MOD Crown Copyright/AS1 Leah Jones

Ukraine three years on

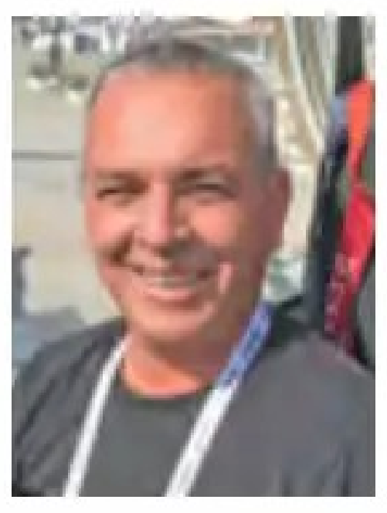
At last, NATO is realising that its 31 member nations will have to start contributing more towards global defence. With Vladimir Putin's shadow looming large over Ukraine and across NATO, the insistence by US President Donald Trump for NATO countries to stump up to 5% of their gross domestic product (GDP) is causing some reaction. Particularly with Trump looking to pull military support for President Zelenskyy following their high profile spat in the Oval Office on February 27.

I recall how in early 2024, Germany were boasting it had finally met NATO's 2% target (with a $76.8bn spend) for the first time since the 1990s. It's true that since taking over from the peace-loving Angela Merkel, the outgoing Chancellor, Olaf Scholz has committed more, but he had to, didn't he. German Defence Minister Boris Pistorius was claiming in early February that 5% was "both unrealistic and unnecessary", but if Trump is to cut back on the US's contribution to NATO, as he did in the later stages of his first term, a solution will have to be found so that those countries in NATO's eastern flank countries remain safe and out of Putin's clutches.

Look at Poland and how it has taken the Russian threat very seriously, by pouring billions into its defence. The sizeable order of 96 AH-64Es last year following the purchase of 32 F-35As in 2020 goes some way to illustrates its commitment. In early February, Polish President Andrzej Duda said that his country plans to spend 4.7% (€30 billion) on defence (4.7% of GDP) – the highest among NATO countries.

Meanwhile, Prime Minister Keir Starmer in late February was calling for 'a coalition of the willing' ready to defend any peace deal between Ukraine and Russia. It made me wonder what air forces would be involved. Undoubtedly, the UK and French would be among them, with the likes of Finland, The Netherlands, Sweden, Poland and perhaps Italy. However, it's unlikely that any British F-35Bs could take part, as the most capable 24 of them will be operating off HMS *Prince of Wales*, which sets sail for the Far East in April. For more on the British F-35 quandaries and Elon Musk's comments, see pages 26-31.

Alan Warnes
Group Editor at Large



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International co-operation has always played an important role during the Mountain Flying Training exercises in northern Sweden. The latest NATO members Sweden and Finland have been training intensively together with their NH-90 helicopters in Abisko since 2016. This co-operation is highly valued by both armed forces *Martin Scharenborg and Ramon Wenink*

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When Donald Trump threatened to unleash maverick ‘Tech Bro’ Elon Musk on the Pentagon, many of the US military’s top brass must have been shaking their heads in despair. Top of the Tesla and Space X owner’s hit list is reported to be the Lockheed Martin F-35 Lightning II combat jet. Tim Ripley looks at what this could mean for the world’s largest military aircraft programme and Britain’s plans to buy more jets

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Russia sets new bombing records

THERE HAS been a significant increase in the number of guided glide bombs and drones deployed by Russia into Ukraine, as the war grinds on into its fourth year.

After 3,140 KAB guided glide bombs were dropped by the Russian Aerospace Forces (RuAF) in January, there was a significant increase by February 24 - a total of 4,300 were dropped, possibly reaching 5,000 by the end of the month, close to the all-time record from October 2024. According to the Ukrainian Air Force (UkrAF), a total of 51,000 KABs were dropped by early January 2025 – 40,000 in 2024 alone.

Russia also set new drone records – in January, a new monthly record was reached – a total of 2,629 Shahed-136 (Geran-2) 'kamikaze' drones, in combination with decoy drones, were launched at Ukraine, but this is likely to be surpassed in February – the total having reached 3,351 by February 25. A new daily record was also reached on February 23 – a total of 267 drones.

The UkrAF continues deploying Western guided glide bombs and air-launched cruise missiles against various high-value targets on the front line or in the immediate rear areas, including in Russia proper. Such missions don't go without casualties – a Su-27 fighter with its pilot, Capt Ivan Bolotov from the 831st Guards Tactical Aviation Brigade (831 BrTA), were lost on February 2 – reportedly being shot down near Pokrovsk by a long-range R-37M (AA-13 *Axehead*) air-to-air missile (AAM), launched by a RuAF fighter. Reports from early February suggest that the UkrAF F-16s are now also involved in such missions.

An UkrAF F-16AM departing on an air-to-ground mission in February, armed with two AIM-120C AAMs (on the wingtips), one AIM-9X and one AIM-9M AAM (the latter below its port wing) and eight GBU-39/B Small Diameter Bomb (SDB) guided glide bombs on two BRU-61/A racks – one under each wing Ukrainian Internet Resources

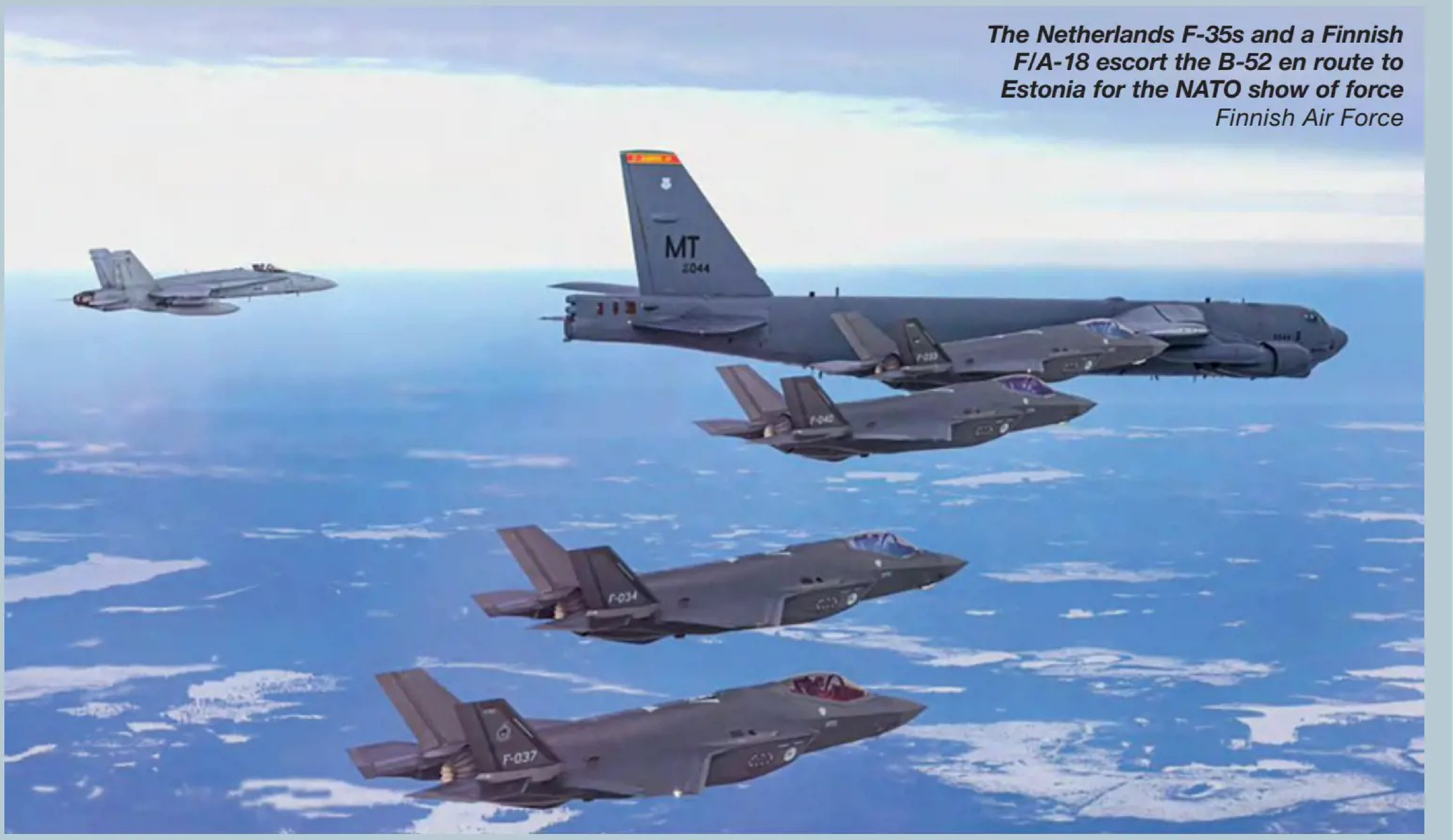
Ukraine now has 20 operational F-16AM/BM Block 15 MLU aircraft after the latest delivery (the first in 2025) – a batch of three ex-Dutch single-seat F-16AMs (serials J-136, J-197 and J-508) – arriving via Poland on February 3. Earlier in 2024 a total of 18 aircraft arrived – 12 from Denmark (a batch in July and a batch in early December, their number being confirmed by the Danish defence minister, Troels Lund Poulsen, on February 24) and six from the Netherlands on September 16 – one of the ex-Danish aircraft being lost on August 26 (see Still in the fight, *AFM* March 2025, p42-49). By the end of 2025 Denmark is ecpected to deliver seven more F-16s (a total of 19) while Netherlands will provide 15 F-16AMs (a total of 24). Norway and Belgium are also expected to contribute an undisclosed number of aircraft this year, Belgium possibly postponing the transfer to 2026 due to F-35 delivery delays, as confirmed by Gen Frederik Vansina, the Belgian Chief of Defence, in an interview on February 20.

On February 6, the UkrAF received the first batch of upgraded ex-French Air and Space Force (FASF) Mirage 2000-5F multi-role fighters. French and Ukrainian officials confirmed this, but the numbers – both in this batch and in total – remain unconfirmed (reported as three and 12-20 respectively by unofficial sources).

Vladimir Trendafilovski

A pair of Mirage 2000-5F multi-role fighters – aircraft 44/'2-EQ' and 40/'2-EX' from the Escadron de Chasse 1/2 'Cigognes' (EC 1/2) – during a training course for UkrAF pilots in 2024. Both aircraft carry a pair of large 2000 lit underwing auxiliary fuel tanks FASF

B-52 flies in show of force



The Netherlands F-35s and a Finnish F/A-18 escort the B-52 en route to Estonia for the NATO show of force
Finnish Air Force

A USAF B-52H on deployment to RAF Fairford, flew within 40 miles of Russia, accompanied by NATO fighter jets on February 24, 2025, in a show of force.

The Stratofortress, which is one of four deployed on February 11 as part of Bomber Task Force (BTF) Europe 25-2, was accompanied by F-35As from the Royal Netherlands Air Forces and F/A-18s from the Finnish Air force, as it flew over Estonia as part of the Baltic state's Independence Day celebrations.

The B-52H, callsign MARB 11, departed Fairford at around 0700hrs heading northeast across Denmark and through the Baltic Sea. After joining up with the fighter aircraft for the flypast, the aircraft flew over Latvia and Lithuania and headed south through the Suwałki Gap, close to the border with Belarus.

At the start of the deployment the four US bombers conducted a routine mission with Finland, France and Sweden; and throughout the month-long deployment, the bombers will participate in a series of exercises and training flights alongside Allied air forces.

"Bomber Task Force missions reinforce our ability to rapidly project combat power, demonstrating US lethality and readiness in a dynamic security environment," said Maj Gen Joseph Campo, US Air Forces in Europe – Air Forces Africa Director of Operations, Strategic Deterrence and Nuclear Integration. "Training alongside our Allies and partners ensures seamless integration, enhancing our collective deterrence and warfighting capability across Europe and Africa."

Norwegian F-35 intercept bomber task force

One of the Russian TU-95 bomber aircraft that was intercepted flying north of Norway
Royal Norwegian Air Force

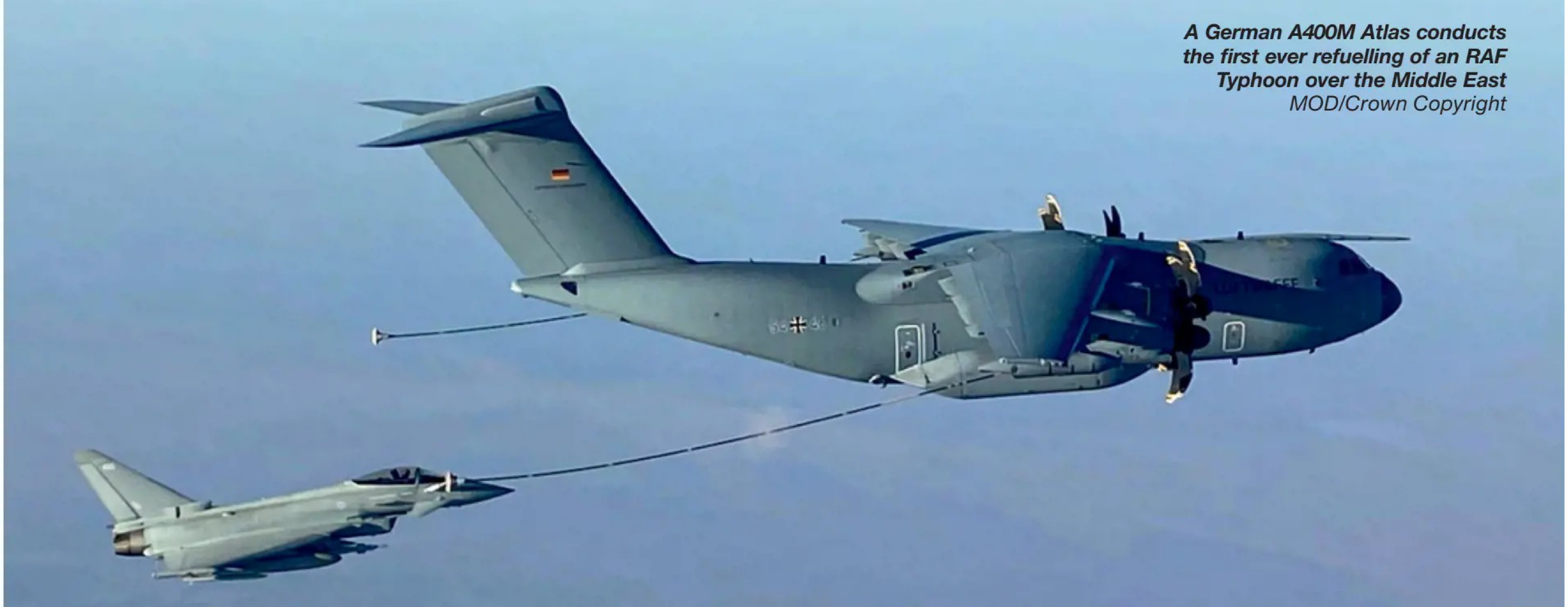
ROYAL NORWEGIAN Air Force (RNoAF) F-35s intercepted two TU-95 *Bear H* bombers, escorted by a pair of Su-27 *Flanker-D* fighters close to NATO airspace on February 4.

RNoAF air chief, Maj Gen Oivind Gunnerad, said: "Our quick reaction alert mission in the High North is important for our national defence and NATO's collective security. The ability to respond swiftly ensures the safety of our airspace and highlights the strength of our allied forces in maintaining peace and stability."

NATO currently oversees five air policing missions – Baltic, Enhance, Icelandic, Benelux and Western Balkans – aiming to ensure the security of Allied airspace. Intercepts like this by the RNoAF, underscore the importance of NATO's Air Policing Mission, especially in the High North and Arctic regions where the mission is more significant due to geographical and geopolitical characteristics.

A continuous presence of fighter jets ensures readiness for them to be scrambled in response to potential communication loss, airspace violation and any activities not adhering to international aviation law.

RAF Typhoons refuelled by German A400M for first time



A German A400M Atlas conducts the first ever refuelling of an RAF Typhoon over the Middle East
MOD/Crown Copyright

RAF Typhoon fighter jets have conducted air-to-air refuelling as part of an exercise to combat terrorist groups in the Middle East. While they have conducted air-to-air refuelling many times, it is the first time it has been done from a German Atlas A400M.

The A400M, a tactical transport aircraft, teamed up with RAF Typhoons as part of the International 'Counter Daesh' Coalition – a group of 70 partners created to fight the Islamic State terrorist organisation, also known as Daesh. The operations were conducted overnight and during the day so that RAF pilots could qualify in refuelling from other aircraft.

The International Coalition has been operating air-to-air refuelling using tankers from the coalition's members – known as 'Purple Gas' – for a long time, and although the RAF have regularly participated in these exercises using Voyager multi-role transport tankers, this is the first time that its Typhoons have taken part.

It is hoped that by participating in regular exercises of this kind, the international coalition can move closer to combatting terrorist organisations, such as ISIS, in the Middle East.

Protector flies over Lincolnshire

The Protector prepares for take off at RAF Waddington
MOD/Crown Copyright

The Protector RG Mk1 (MQ-9B), a remotely piloted Air System (RPAS), completed its second flight in February, undertaken with an all-UK crew. Currently based at RAF Waddington in Lincolnshire, it is at the forefront of future intelligence aviation platforms. It is now in Phase 3 of its test and evaluation programme and sits with the 56 (Test and Evaluation) squadron.

The Protector will deliver a cutting-edge RPAS and unlike its predecessor Reaper, it will be able to integrate into UK domestic airspace, supporting Military Aid to Civilian Authorities (MACA) tasks alongside combat and intelligence roles. Wing Commander Podmore of 56 Squadron said: "Today's flight was a significant milestone and a culmination of a huge effort across the entire Protector enterprise. The flight test team, led by 56 Squadron and supported by 31 and 54 Squadrons, should be tremendously proud noting this event marks the start of key integration and operational testing for the platform."

Merlins fly commandos into Norway

MOD/Crown Copyright

A Royal Navy Merlin Mk4 from 845 Naval Air Squadron (NAS) disembarks troops from 45 Commando during a troop insertion exercise into an exercise area in Norway's Mauken mountain range during Operation Clockwork 25 last month (February).

The UK has conducted cold-weather training in Norway for over 50 years and is a committed and capable partner in the High North, being one of only a small number of nations capable of operating in this demanding environment.

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NATO F-35s join forces for Spartan Lightning

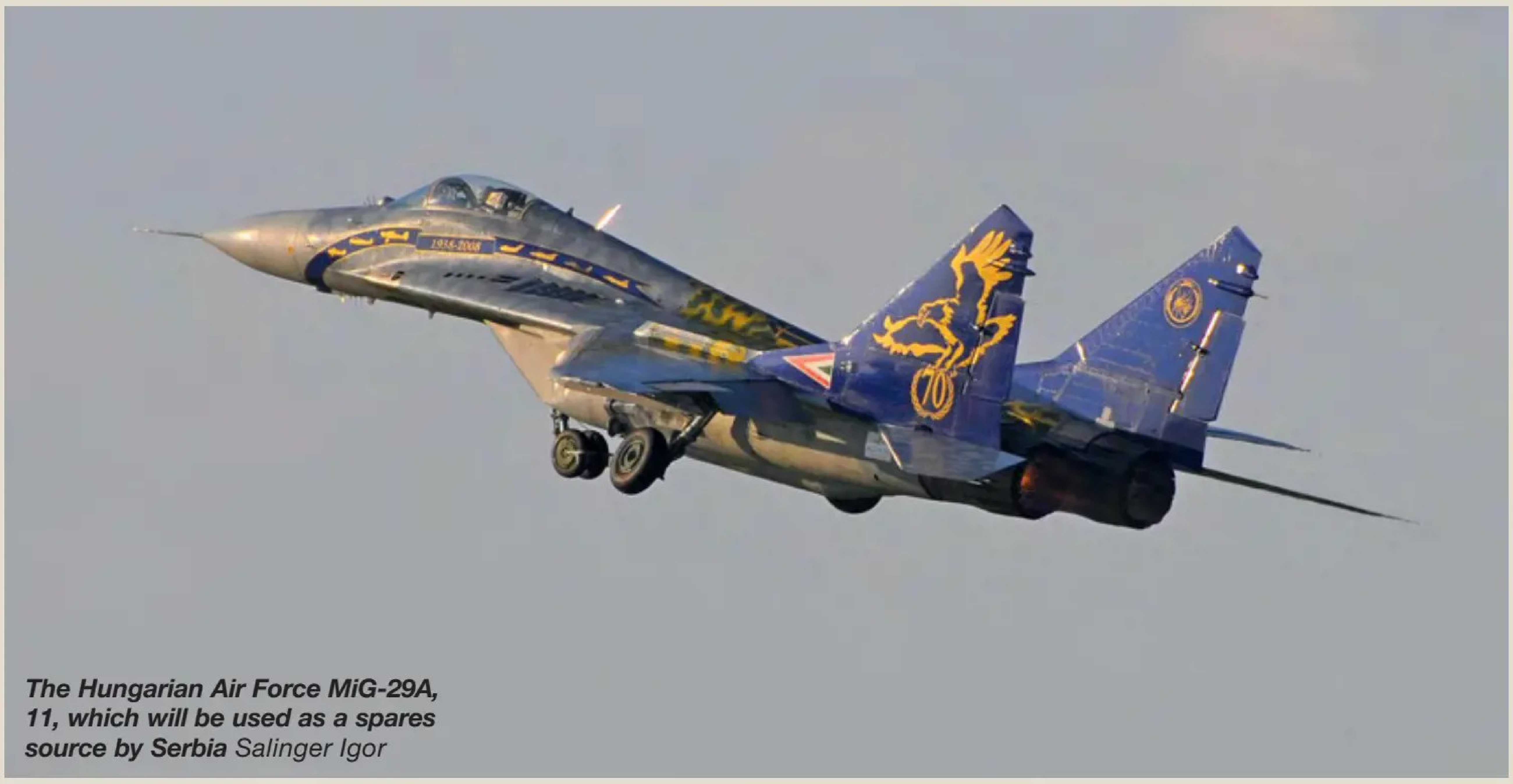
SEVEN F-35A Lightning II aircraft took part in February's exercise Spartan Lightning at Ramstein Air Base, Germany, including jets from the Netherlands, Norway and the United States.

"This Spartan Lightning iteration was the first of its kind because we flew in seven F-35s to Ramstein for the pilots to participate in the simulator training and for the maintenance personnel to participate in cross-servicing of each other's airplanes," said Lt Col Jared Marvin, 5th Combat Training Squadron D Flight Commander.

Spartan Lightning is traditionally a simulated exercise but under NATO's Agile Combat Employment (ACE) concept, flying aircraft and personnel into the event made opportunities available for cross-servicing. "We wanted to focus on learning and the differences and similarities between how each of our NATO Allies and partners accomplish aircraft maintenance," said MSgt Chris Bryant of the USSAF's 495th Fighter Squadron, based at RAF Lakenheath. "This way we can have any of our allies and partners send their fighter aircraft and pilots to locations around the NATO theatre and have the confidence that everyone is on the same page and the mission can continue to run smoothly."

Seven F-35A Lightning II aircraft took part in the exercise, with pilots and maintainers from the Dutch, Norwegian and United States air forces. *USAF*

Serbia Expands MiG-29 force with jet from Hungary



The Hungarian Air Force MiG-29A, 11, which will be used as a spares source by Serbia *Salinger Igor*

SERBIA HAS acquired an additional MiG-29 fighter jet from Hungary, it was confirmed by Assistant Minister of Defence for Material Resources, Dr Nenad Miloradović, at IDEX 2025 in Abu Dhabi. The jet, which is expected to serve primarily as a source of spare parts for Serbia's current MiG-29 fleet, arrived in the country last summer. It is a former Hungarian Air Force aircraft in the 9.12B version, identical to the MiG-29s previously operated by the Yugoslav Air Force.

Miloradović stated: "We consider this to be a good deal within the framework of our already robust collaboration with Hungary," Miloradović said, adding: "We've secured a diverse range of equipment, including aviation assets, under very favourable conditions. This specific aircraft is only a small portion of the larger procurement. Whether more aircraft will be added remains to be seen in due course."

The Serbian Air Force and Air Defence currently operates a mix of MiG-29 variants, including the 9.12 (single-seat) and 9.51 (two-seat) models from the original batch delivered to Yugoslavia in the late 1980s, as well as the 9.13 variant, some of these jets were part of donations from Russia and Belarus in 2017 and 2021, bringing the total to 14 MiG-29s. These aircraft have undergone various upgrade stages and are now referred to as MiG-29SM. The modernisation process has transformed them from air superiority fighters into multirole combat aircraft, with enhanced capabilities for carrying guided air-to-ground ordnance, as well as updated air-to-air missiles.

The Hungarian MiG-29 9.12B that has been purchased is notable for its paint scheme commemorating the 70th anniversary of the Hungarian Air Force (Magyar Légierő) in 2008. The aircraft (c/n 35161/4604) was stationed at Kecskemét Air Base as part of the 59th Tactical Fighter Wing (MH 59. Szentgyörgyi Dezső) 2nd Fighter Squadron (2. Repülőszázad Dongo).

Salinger Igor

Montenegro to sell Gazelle helicopters and G-4 trainers

Soko G-4 Super Galeb aircraft sporting Montenegro Air Force markings *Salinger Igor*

THE MINISTRY of Defence of Montenegro has announced a tender for the selection of evaluators for surplus military assets planned for sale, marking another attempt to offload unneeded equipment inherited from the former Yugoslavia, which remains in Montenegro following the dissolution of the state union with Serbia back in 2006.

The tender calls for value assessment for Soko G-4 Super Galeb advanced jet trainer aircraft, Soko/Aerospatiale SA341/2 Gazelle helicopters, armoured vehicles, Bofors anti-aircraft guns, multiple rocket launchers and ammunition.

"The value of the tender, which is divided into several lots, is €50,000, including VAT. The work is expected to be completed within one to two months from the signing of the contract with the most favourable bidder," reports the Montenegrin publication *Vijesti*.

The sought service involves appraising the value of ten Gazelle helicopters plus associated weapons, equipment and spare parts. The helicopters were withdrawn from active service in the Montenegrin Air Force a few years ago after two accidents and several minor incidents. Since then, they have been stored in hangars at the military airport in Golubovci.

According to the long-term defence development plan for 2019-2028, it was initially intended for only four SA342 helicopters in their armed anti-tank *Gama* variant to remain in operational service after overhaul and modernisation. However, this plan was abandoned, *Vijesti* reports. With this decision, Montenegro has said farewell to combat aviation component.

The Montenegrin Armed forces plans to "arm and equip, in the near future, two of its three remaining medium multi-purpose Bell-412 EP/EPI helicopters for simpler combat support tasks with infantry units," the source states, noting that these helicopters are "nowhere near as suitable for anti-tank combat as the armed Gazelles".
Salinger Igor

Upgraded Bayraktar Kizilelma starts flight testing

A BAYRAKTAR Kizilelma unmanned fighter jet successfully completed its Aerodynamic System Identification Test on February 27. Departing from the AKINCI Flight Training and Test Center in Çorlu, Turkey, the aircraft's production prototype, Kizilelma PT3, flew at medium altitude for 53 minutes.

The jet is the latest version of the unmanned fighter, which has been fitted with a new engine that has been upgraded to include an afterburner, allowing it to reach speeds close to Mach 1.

The Bayraktar Kizilelma undergoing flight tests in Turkey on February 27 *Bayraktar*

First German P-8A flies

THE MAIDEN flight of the first P-8A for the German Navy, N878DS, (BuNo 170528), took place at Boeing Field in Seattle, United States on February 22. It will become 63+01 when delivered to Marinefliegergeschwader 3 (MFG3) at Nordholz.
Joe G. Walker

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Final ARIES II retired

EP-3E BuNo 159893 makes its final approach to land at Davis-Monthan AFB, Arizona, on February 13, 2025. Its arrival at the Tucson base brought the ARIES II's naval career to a close. The aircraft joins 13 EP-3Es already in storage with the 309th Aerospace Maintenance and Regeneration Group Ned Harris

THE US Navy retired its last EP-3E electronic intelligence aircraft during a ceremony at Naval Air Station Whidbey Island, Washington, on February 12, 2025, marking the end of the type's 45-year career. The Airborne Reconnaissance Integrated Electronic System (ARIES) first entered service in 1970. Assigned to Fleet Air Reconnaissance Squadron VQ-1, BuNo 159893 was the final ARIES II assigned to the 'World Watchers' and it departed the base one day later. The EP-3E carried out its final mission in the US 5th Fleet's Area of Responsibility on October 29, 2024, and returned to NAS Whidbey Island on November 6.

The manned airborne signals intelligence mission that had been assigned to the EP-3E is being taken over by the MQ-4C Triton high-altitude, long-endurance unmanned aerial vehicles operated by Unmanned Patrol Squadron VUP-19. The US Navy operated 27 EP-3Es including 17 P-3Cs that were converted to EP-3E ARIES II configuration. VQ-1's final aircraft, P-3C BuNo 161588, used both as a trainer and a support aircraft, was retired at Whidbey Island on February 20 and the squadron will formally be deactivated on March 31.

Jolly Green II arrives at Moffett

The crew of HH-60W 21-14522 prepares to shutdown at the conclusion of the Jolly Green II's delivery flight to Moffett Air National Guard Base, California, on February 2, 2025 US Air National Guard/MSgt Ray

THE CALIFORNIA Air National Guard's 129th Rescue Wing became the latest unit to begin the transition between the Sikorsky HH-60G and the more capable HH-60W when it received its initial Jolly Green II helicopter on January 31, 2025. A second HH-60W arrived on base two days later. Based at Moffett Federal Airport in Sunnyvale, the wing's 129th Rescue Squadron will receive its full allotment of six helicopters by the end of 2026. The unit has flown the earlier Pave Hawk since 1991.

Idaho National Guard deploys to Virginia

THE IDAHO National Guard's Company B, 1st Battalion, 183rd Aviation Regiment recently began a one-year deployment to Fort Belvoir, Virginia. Operating from Davison Army Airfield, the unit's ten UH-60M helicopters will support various operations including the Joint Emergency Evacuation Plan (JEEP). The helicopters and crew departed from Boise's Gowen Field following a farewell ceremony on January 9. Shared by National Guard and active-duty units from across the nation, the JEEP is a recurring mission that provides airlift capabilities to official personnel in the National Capital Region that surrounds the District of Columbia. The mission had previously been supported by units of the Louisiana Army National Guard including Company A, 1st Battalion, 244th Aviation Regiment, which is based at Hammond Northshore Regional Airport and also operates the UH-60M.

USS *Tripoli* to join forward deployed fleet

The Amphibious assault ship USS Tripoli (LHA 7) sails in the East China Sea during a training evolution with the USS America (LHA 6) on September 17, 2022 -US Marine Corps/LCpl Christopher Lape

The US Navy announced that America-class amphibious assault ship USS *Tripoli* (LHA 7) will change its homeport when it relocates from San Diego, California, to Sasebo, Japan. Tripoli will replace USS America (LHA 6), which will depart Sasebo and move to San Diego as part of a scheduled rotation of forces in the Pacific. The forward deployed 'amphib' supports the deployment of the 31st Marine Expeditionary Unit and serves as the flagship of the Amphibious Ready Group.

Bamboo Eagle strengthens F-35 pilots' skills

An F-35A Lightning II lands at Naval Air Station North Island, California, after a mission on February 11, 2025. The Airmen, from the 388th Fighter Wing's 421st Fighter Squadron at Hill Air Force Base, Utah, are participating in Bamboo Eagle 25-1 USAF/Micah Garbarino

BAMBOO EAGLE 25-1, a US Air Force Warfare Center exercise is hoped to strengthen the skills of F-35 pilots, across the Western United States.

Naval Air Station, North Island, in San Diego, which serves as a 'Spoke' location for the F-35's, has brought many challenges for the 421st Fighter Squadron, also known as 'Black Widows'.

"Other exercises can get our pilots used to working with others through the fog and friction of war, but not at the size and tempo of Bamboo Eagle," said Lt Col Bryan Mussler 421st FS Commander.

"We've got pilots taking off, tasked with missions they weren't expecting, for much longer than they were expecting, and landing somewhere they weren't expecting. The unpredictability built into this exercise gives us a realistic look at what the fight will be like."

Whilst there is uncertainty going forward, the emphasis is on honing in on the pilots' already high level of skills.

"We're trying to get somewhere between standard training and combat experience," Mussler said. "Our day to-day training at home station is very low risk compared to the actual fight. Bamboo Eagle helps us bridge that gap to combat, so when that night comes, we are confident with what we're being tasked to do."

The missions carried out during Bamboo Eagle were both offensive and defensive involving counter-air, escorting other assets surface-to-air threats. "That's the F-35's "bread and butter" mission," Mussler said.

In addition to the combat scenarios, the exercise hopes to improve the squadron's airmanship – piloting a single-engine fighter over the Eastern Pacific Ocean for long durations, covering vast distances, navigating unfamiliar airspace and learning to land on different airfields.

"We have new F-35 pilots who have been with the squadron for two months and they've refuelled more this week than they ever have before, and in conditions they never have before," Mussler said.

"We're hundreds of miles out over the ocean, and you can't simulate that feeling."

Sentry Aloha exercise boosts readiness

THE HAWAII Air National Guard's 154th Wing concluded its long-running readiness exercise, Sentry Aloha, on February 12.

Designated Sentry Aloha (SA) 25-1, this iteration began on January 29. It brought approximately 800 joint personnel, including guardsmen, reservists, locally based active-duty partners from the 15th Wing, sailors and marines and nearly 30 aircraft from six states.

For over 20 years, SA has enabled tailored, cost-effective and realistic combat training for the Air National Guard, US Air Force, and other Department of Defense services. It provides US warfighters with the skills to perform homeland defence and overseas combat missions.

Sentry Aloha is built around Dissimilar Air Combat Training (DACT), which challenges pilots to engage in combat scenarios against aircraft with different performance capabilities. Rather than training against identical airframes, DACT forces pilots to adapt to unpredictable engagements, testing their ability to exploit their platform's strengths while capitalising on adversary weaknesses. The exercise operates at an intense tempo, with participants generating back-to-back combat training sorties daily.

Guest participants included US Navy F-35C Lightning IIs from Air Test and Evaluation Squadron (VX-9) at Edwards AFB, California and US Air National Guard KC-135 Stratotankers from Washington and Mississippi. Visiting aircraft took part in simulated combat exercises with F-22A Raptors operated by the 199th and 19th Fighter Squadrons' Hickam-based 'Hawaiian Raptors'.

F-22A Raptors and a KC-135 Stratotanker taxi along the runway at Joint Base Pearl Harbor-Hickam, Hawaii, on February 5, during exercise Sentry Aloha 25-1
USAF/SrA Roann Gatdula

Joint maintenance teams launched, recovered and maintained the fifth-gen fighters, refuelling tankers and cargo aircraft. The successful execution of these flight operations highlights the importance of Hawaii's strategic location and training environment.

"Hawaii offers great weather, an abundance of over-water airspace to train in the Indo-Pacific Theater, as well as the opportunities to practice those agile combat employment tactics, techniques and procedures," said USAF Lt Col Matthew Ohman, 201st Combat Operations Squadron, Sentry Aloha senior director. "The Hawaiian Raptors rely heavily on these exercises to accomplish mission readiness. It's a culmination of a lot of training."

Ghostriders move to Hulbert Field

THE DEPARTMENT of the Air Force has selected Hurlburt Field, Florida, as the preferred, and final location to host the 711th Special Operations Squadron and 919th Special Operations Maintenance Group. This action will move 425 Air Force Reserve Command billets at Duke Field, Eglin Air Force Base, Florida, to Hurlburt Field to support the creation of two Special Operations Task Units. The units will fly and maintain AC-130J Ghostrider gunships, which provide close air support, air interdiction and armed reconnaissance. Initial Operational Capability is planned for the autumn of 2026, with full operational capability in mid-2028.

Caribbean mission for reconnaissance jet

A US Intelligence jet, N2100L, a Bombardier Global 6500 registered to Lasai Aviation II LLC has flown into a Caribbean island of Curaçao. The aircraft is understood to be operated as the training aircraft for the US Army's High Accuracy Detection and Exploitation System (HADES) programme. It arrived in Curaçao on February 24, flying in from Fort Bliss, Texas, via a short stop in Puerto Rico. While in Curaçao, the jet operated from Cooperative Security Location ramp.
Patrick Lalande

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Booming IDEX

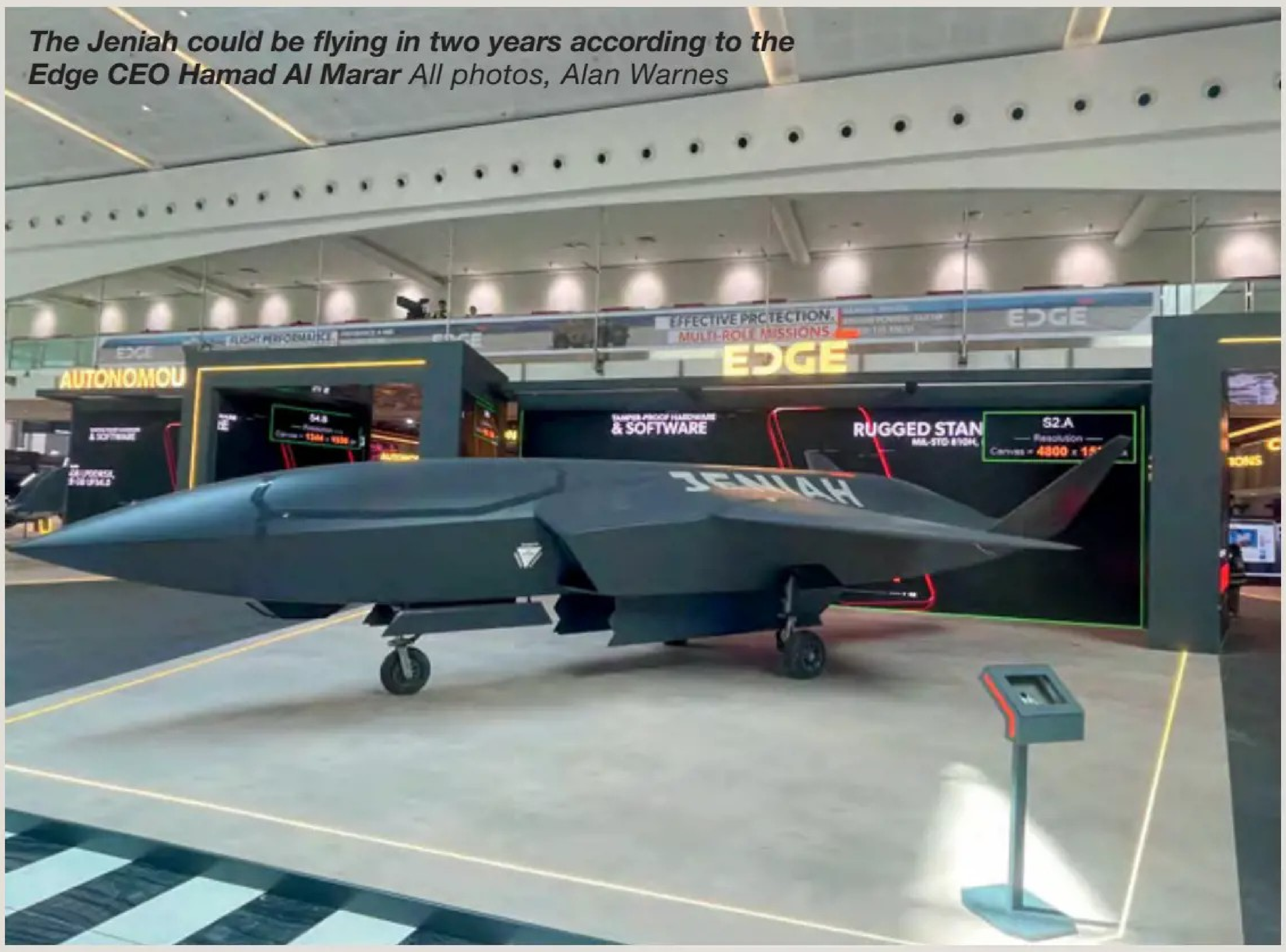
Alan Warnes reports on the highlights at this year's International Defence Exhibition (IDEX) at the Abu Dhabi National Exhibition Center from February 17-21

Edge's Jeniah flagship evolves

TWO YEARS after being unveiled at IDEX 23, there appears to have been movement with the design of Edge's Jeniah (Arabic for 'ghost') unmanned combat air vehicle (UCAV). The first significant modifications to the mock-up on show were the undercarriage's jagged doors and the electro-optical targeting system (EOTS) positioned under the nose.

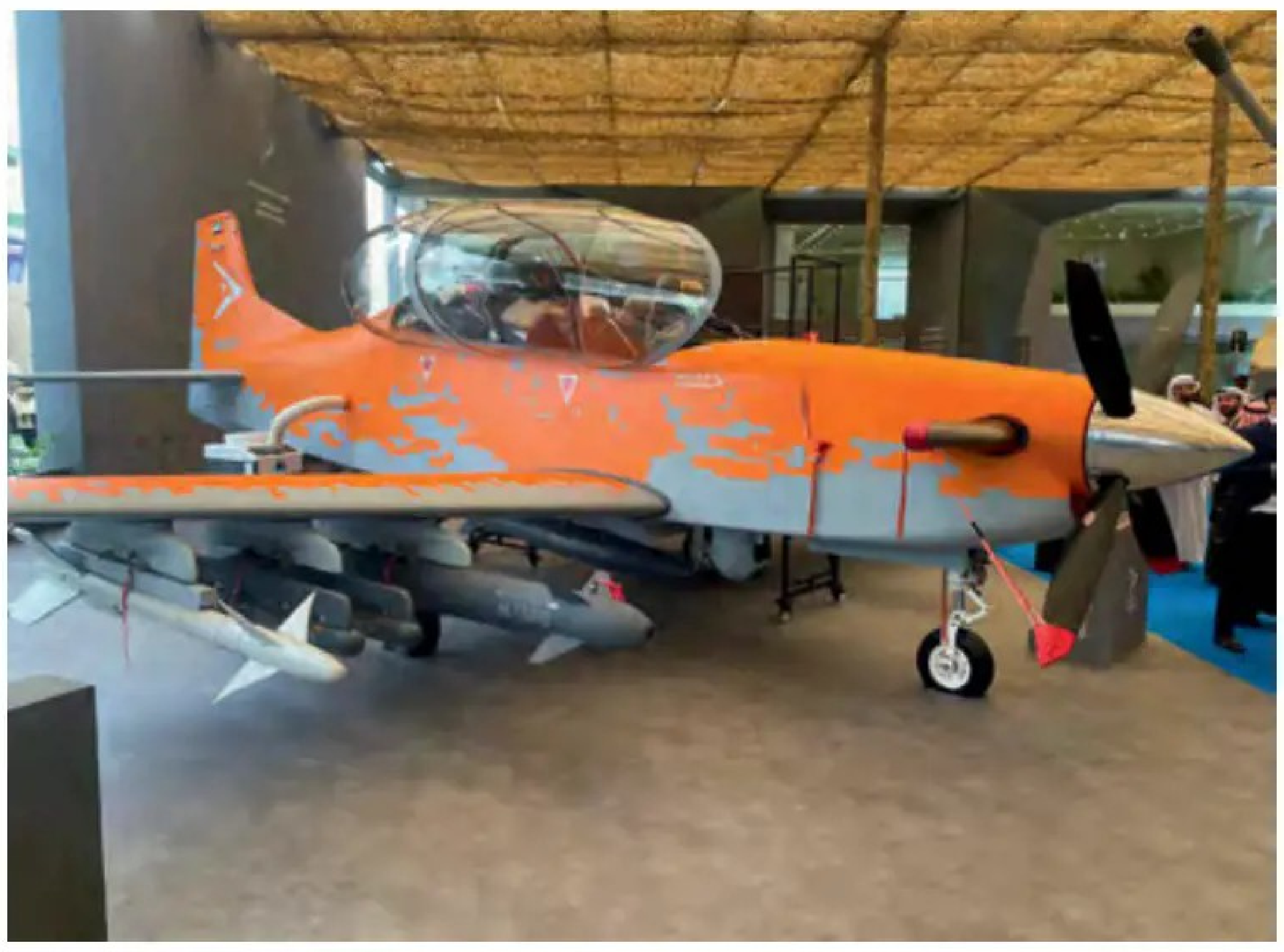
Edge claims the UCAV will carry a payload of 480kg and have a maximum take-off weight of 4,000kg. Behind the full-scale model was a video of an 80% mock-up undergoing a test flight to prove aerodynamics. No powerplant has yet been selected, with Edge in discussions with manufacturers to acquire a turbofan engine. Positioned next to the Jeniah was a Halcon P32 Thunder precision guided munition, two of which could be housed in the weapons bay.

The low observable high speed Jeniah is not expected to fly for another couple of years, but it is more likely be used for manned/unmanned teamings with the Dassault Rafale rather than the nEUROn, which were on display at the French aerospace company's stand.



The Jeniah could be flying in two years according to the Edge CEO Hamad Al Marar *All photos, Alan Warnes*

More B-250 prototypes set to fly



Above: ***Parked inside the Calidus pavilion, B-250T 981 is still wearing the orange colour scheme in which it debuted at the Dubai Airshow in 2013. The second protype, B-250 982, wears a grey scheme.***

CALIDUS IS under new management and has expanded into vehicles and weapons. The company showed off the first prototype B-250T, 981, sporting an orange colour scheme, with new Aselsan avionics in its cockpit (although Calidus was reluctant to admit they were the Turkish company's design).

The B-250 is being designed for missions such as close air support, intelligence, surveillance, targeting and reconnaissance (ISTAR), persistent air support, counterinsurgency (COIN) and training.

The Abu Dhabi company has three more B-250 prototypes being built at its facility, earmarked for development and certification of the type. They will be representative of the 12 aircraft on order and 12 on option by the UAEAF&AD known as 'P12', announced in a $620 million deal at the Dubai Air Show in November 2019. The first one (001) is expected to fly soon and will feature both ground attack and advanced mission trainer configurations.

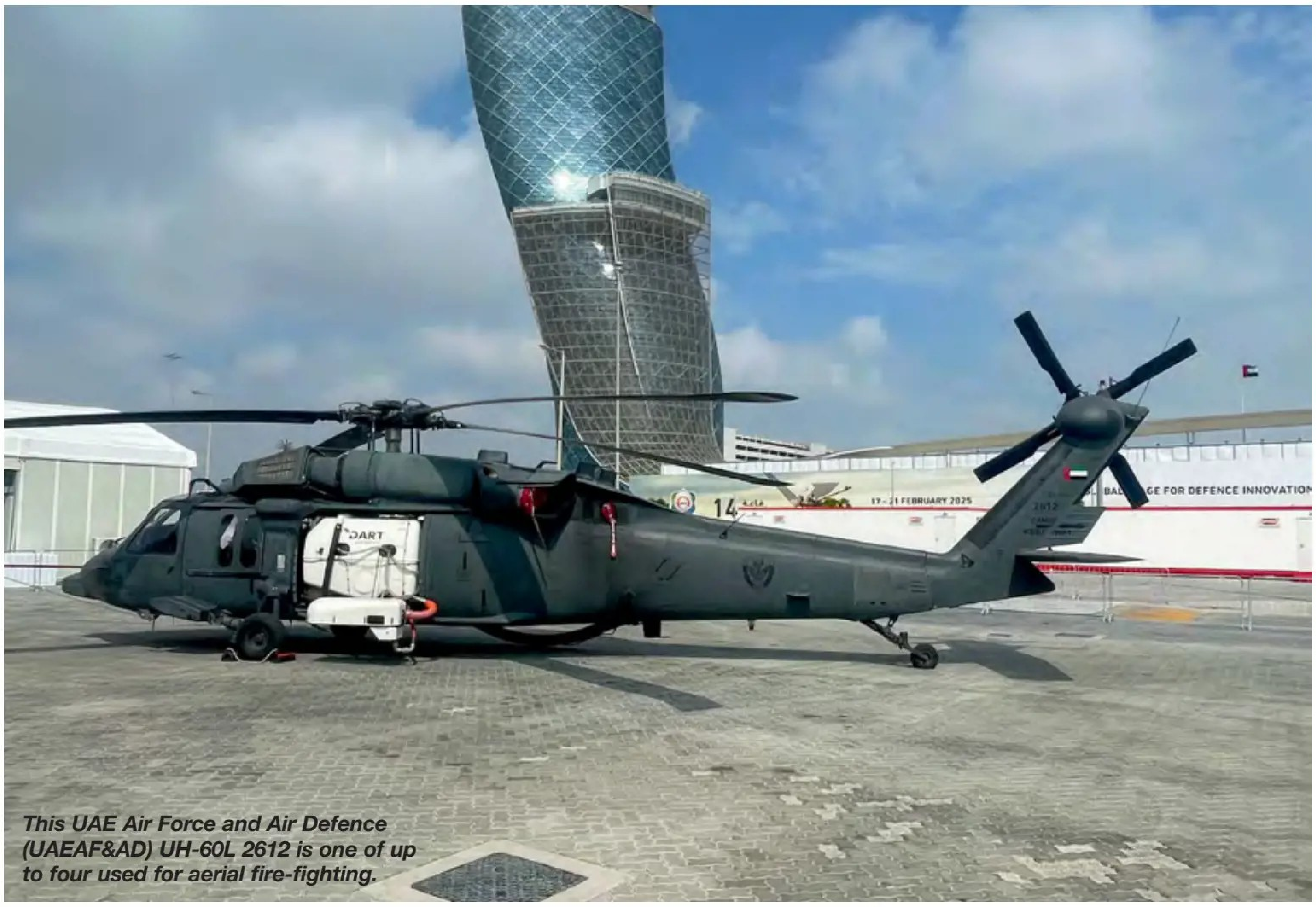
All three new prototypes will be involved in several flight test campaigns to speed up the certification of the mission systems, such as electronic warfare, stores management system and weapons integration.

The Desert Sting 16 and Desert Sting 25, as well as Halcon P32 Thunder precision guided munition, are all being integrated for the ground attack role. One surprise addition to the aircraft's armoury was the Alheda (named after a Falcon that flies from fire to fire) long-range anti-tank missile (LRATM).

According to a Calidus source, progress with the B-250T trainer is not as rapid as the B-250, because the UAEAF&AD is still considering its basic trainer options. In addition to the UAEAF&AD P12 deal, another eight are also being built in the WX-80 configuration specifically for the cloud-seeding or rain-making role. This modified B-250 houses a weather radar to continuously monitor the atmosphere and optimise the deployment of cloud seeding material to encourage the formation of raindrops.

According to Calidus, the company is expecting a substantial order for the B-250 from its first export customer by the end of the year, but no one at the stand was willing to name the country.

Local UH-60L firefighter



This UAE Air Force and Air Defence (UAEAF&AD) UH-60L 2612 is one of up to four used for aerial fire-fighting.

A FIREFIGHTING UH-60L of the UAE Air Force and Air Defence's Joint Aviation Command was displayed on the corniche. The military is testing and evaluating a Dart Aerospace SkyCannon system on the Blackhawk, comprising an 850-gallon water tank, supported by a 50-gallon foam derivative. The SkyCannon was designed to control and contain high-rise fires by allowing the helicopters to reach beyond ground-based firefighting efforts with a directed low-pressure, high-volume water stream. The system works with Dart water tanks to pump water through an extended boom off the nose of the aircraft. A hover pump positioned on the right-hand side is lowered into the water, which is then sucked up into the tank. Alternatively, it can be extracted from a fire truck.

A JAC spokesperson said: "We have been training on this system and evaluating it since 2022, to control high altitude [high-rise] fires, initially to cool down the blaze before the firefighters arrive. The cannon that fires the water is 7.6m long and can move 110° to the right and 30° down if required, to be more accurate."

UAE looking at Airbus C295 tanker?

WHILE THE United Arab Emirates Air Force and Defense initially took delivery of five C295s from 2019, they have recently acquired the two ex-Royal Jordanian Air Force examples, according to several sources at IDEX. Clearly the UAEAF&AD is looking to upgrade the capabilities of the fleet in the wake of last November's deal between Airbus Defence and Space and Edge's EPI, to start serial production of C295 Cargo Compartment Removable Tanks (CCRTs) over a five-year period. The CCRT tank is designed for applications such as ground refuelling (GR), extended range (ER) missions and air-to-air refuelling (AAR). Jean-Brice Dumont, head of air power at Airbus Defence and Space, said: "The recent addition of the CCRT enhances the C295's capabilities, enabling new missions such as aerial refuelling."

An Airbus source at IDEX said the tanker version of the C295, known as the Tanquerilo (small tanker) will be equipped with a fuselage refuelling unit (FRU), effectively the hose-and drogue system that RAF A330MRTTs are equipped with, allowing it to refuel large probe-equipped aircraft such as A400Ms or C295s. The source said: "While the A400M has underwing refuelling pods, it doesn't have an FRU, so we plan to install it on the C295. A C295 did successfully make a wet contact back in January 2020 with a refuelling system, but then further development was halted. In November last year, we announced the industrialisation and to date have only developed the tank. We will now design the FRU and fit it in the C295 on a roll-on roll-off system. The three CCRTs can also extend the range of the aircraft if you don't want to do AAR."

It's likely the UAEAF&AD will adopt the Tanquerilo version of the C295, as could several other customers, including the Indian Air Force. Over 300 C295s have been sold to date, so the Tanquerilo could have a sizeable market

Rosoboronexport is offering India the chance to assemble the Su-57E on home turf, but Delhi pulled out of the joint PAK FA/Fifth-Generation Fighter Aircraft project with Russia in the late 2010s, preferring instead to develop its own AMCA

All photos, author

IAF frustrated with HAL

Gordon Arthur reports from Aero India 2025, on how the Indian Air Force is getting extremely frustrated with Hindustan Aeronautics Limited (HAL)

THE TALKING point at Aero India 2025 – held at Yelahanka Air Force Station in Bengaluru from February 10-14 – was fifth-generation fighters. Present was the Lockheed Martin F-35A from the US Air Force and the Sukhoi Su-57E from Russia. While Indian commentators were applauding India's ability to attract the latest combat aircraft from opposing blocs, this fifth-generation duel merely provided a distraction from the Indian Air Force's (IAF) real problems.

The statistics are stark. Between 2014 and 2024, China increased its fighter arsenal by 435, while Pakistan boosted its inventory by a more modest 31 jets. However, in that same ten-year period, the IAF lost an incredible 151 fighter airframes. India is not only failing to keep pace with nemeses China and Pakistan, but it is going backwards in terms of combat capability.

Indian Air Force lagging

Instead of the IAF's sanctioned 42 fighter squadrons, the force is lagging at just 31 squadrons. This situation will worsen when two squadrons of obsolete MiG-21s retire by year's end.

Air Chief Marshal AP Singh, Chief of the Air Staff, spelled out the situation clearly: "We need to actually produce or induct aircraft at the rate of two squadrons per year to cater for the ramped-up numbers we want… We have a lot of fleets that, in another five to ten years, we'll have to phase out. So those fleets will have to be filled up also, plus we already have vacancies. So we're looking at inducting 35-40 aircraft a year that are to be produced somewhere. I understand those capacities cannot come overnight, but we need to start pushing ourselves towards that." The IAF will start phasing out Mirage 2000s, Jaguars and MiG-29s in around 2030.

A Rosoboronexport official said Delhi could manufacture the Su-57 in India and enjoy full technology transfer. However, the Su-57E is not on India's 'bingo card', as Delhi previously pulled out of the collaborative project that ultimately led to the Su-57.

The same week as Aero India 2025, Prime Minister Narendra Modi met President Donald Trump in the White House, the latter insisting he was "paving the way to ultimately provide India F-35 stealth fighters". India was surprised by Trump's dangling carrot, but it is questionable whether the F-35 is the best solution for the IAF. For example, how would India integrate F-35s into existing command-and-control networks, alongside Russian-designed Su-30MKI fighters? The IAF would end up with an elevated F-35 capability that cannot fuse data with other assets.

Cutting through the patriotic backslapping that goes on in Indian official and media circles, Singh has been refreshingly blunt in his assessments. Speaking at a seminar on February 28, he reiterated the priority on Indian-manufactured aircraft. "Even if a domestic system delivers 85% or 90% of the performance offered by international products, we'd still choose to go with the home-grown option," he said.

Impatient with HAL

Unfortunately, the IAF is getting impatient waiting for state-owned Hindustan

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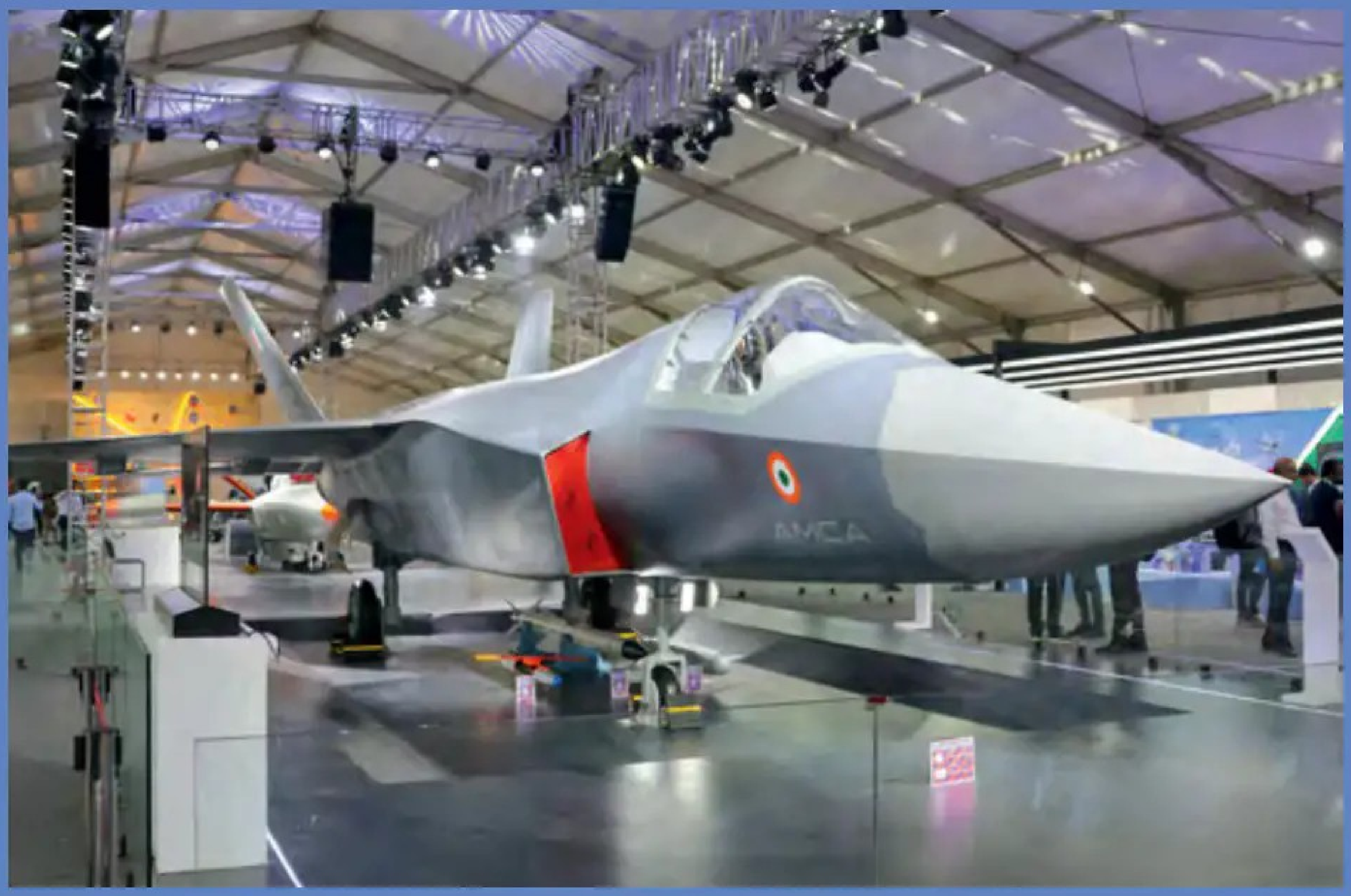

Above Left: ***The USAF dispatched two F-35A Lightning II fighters to India, and the US government dangled the prospect of selling the platform to India that very same week. The F-35As were from Elmendorf Air Force Base in Alaska***

Above right: ***The government's Aeronautical Development Agency displayed for the first time a full-scale model of the Advanced Medium Combat Aircraft (AMCA). Minor modifications may still occur, but the model depicts the overall configuration of the fifth-generation AMCA***

Aeronautics Limited (HAL) to excruciatingly ramp up production. Singh said earlier: "I can only tell you what our requirement and our worries are. You have to alleviate those worries and make us more confident. At the moment, I'm just not confident in HAL." The IAF chief lamented that HAL "is just not in mission mode. I'll be the happiest person if I'm proved wrong. I feel that only a few are putting in any effort, or maybe everyone is putting in effort in their own silos without looking at the overall picture. Something has to change; some drastic change."

Responding to those comments, Dr D.K Sunil, HAL's Chairman and Managing Director, said at an Aero India 2025 press conference: "The delay is not simply attributable to laziness on the part of industry. There have been technical issues which have got sorted out. The concern of the air chief is understandable… I think the concern is well understood."

Meeting programme schedules has been a perennial bugbear for HAL. It was supposed to deliver the first Light Combat Aircraft (LCA) Tejas Mk1A jets in February 2024, but they are yet to be handed over. HAL is blaming late delivery of General Electric F404-GE-IN20 engines. Nonetheless, four Tejas Mk1As flew at Aero India 2025, suggesting delivery is imminent. HAL is supposed to produce 83 LCA Mk1As by 2029.

To date, HAL has delivered 36 of 40 Mk1 aircraft, with two squadrons currently in existence. A new deal for 97 additional LCA Mk1As should be signed this year. The Mk1A has an improved radar and avionics, a

During the flypast, the Indian Navy contributed this formation of a P-8I Neptune maritime patrol aircraft accompanied by pairs of MiG-29K fighters and Hawk 132 trainer jets

refuelling probe, better maintainability and the ability to carry more diverse weapons.

After that is planned 120 four-plus-generation LCA Mk2 aircraft, these due from 2028-35. The Mk2 features a more powerful F414-GE-INS6 engine (negotiations for Indian production are ongoing), improved radar and extended range.

Fill voids quickly

Due to protracted development and delivery of aircraft, the IAF has glaring gaps to fill. Singh acknowledged that it is not always possible to wait for Indian-manufactured platforms. "At the moment, we all know that we're very badly off when it comes to numbers, and the numbers which were promised are also coming a little slow. So there'll be a requirement to go and look for something which can quickly fill up these voids."

This suggests renewed effort on the Multi-Role Fighter Aircraft (MRFA) programme that envisages 114 new fighters. Some will be purchased off the shelf from overseas, and the remainder built in India. Contenders include the Boeing F-15EX, Dassault Rafale, Eurofighter, Lockheed Martin F-21 (a customised F-16) and Saab Gripen E. As well as more rapid induction, Singh explained: "That'll give us a boost because new technology will come to India at a quicker pace."

Ironically – and typical of Indian defence procurements – the MRFA requirement is almost identical to the failed 126-aircraft Medium Multirole Combat Aircraft (MMRCA) effort launched in 2007. In other words, little progress has been achieved in the past 18 years. The only real progress was an emergency procurement of 36 Rafales in 2016, after MMRCA was cancelled.

To obtain 114 MRFA jets, India must explore greater collaboration between foreign companies and Indian private-sector players. A good model is Airbus and Tata, which are jointly producing C295MW medium transport aircraft for the IAF.

India's own fifth gen

Another reason why India should be reluctant to pursue either the F-35 or Su-57 is the Aeronautical Development Agency's (ADA) development of the fifth-generation Advanced Medium Combat Aircraft (AMCA). A projected 120 AMCAs should be delivered from 2036 onwards, although HAL's status as their manufacturer is not assured, and slippages in its adoption are inevitable.

ADA displayed a full-scale model of the AMCA for the first time at Aero India 2025, but the AMCA project risks being stifled if money is redirected towards American or Russian fifth-generation fighters. However, with two Chinese fifth-generation fighters now in service and sixth-generation types already in flight, India is lagging behind its antagonist by around two decades.

Yet another future programme is the Twin-Engine Deck-Based Fighter (TEDBF), a fifth-generation carrier-borne fighter due after 2038. The TEDBF will replace Indian Navy MiG-29Ks but, because of the considerable gap before the programme reaches fruition, India is set to ink a deal for 26 Rafale M carrier-borne fighters in the interim.

Another pending requirement, following a 2023 request for information, is for Medium Transport Aircraft (MTA). Airbus A400M, Embraer C-390 and Lockheed Martin C-130J are contenders, and examples of each appeared at Yelahanka. Embraer is proposing a regional assembly hub in India if the C-390 is selected. The IAF requires up to 80 MTAs to replace elderly An-32s and Il-76s.

Two modified HJT-36 Yashas intermediate jet trainers appeared at Aero India 2025 too. The troubled HJT-36, which first flew in 2003 as the Sitara, was officially renamed on February 10 after significant modifications were implemented to address the trainer's unpredictable stall and spin characteristics.

Among other changes, the fuselage was lengthened by 1.4m, ventral fins were added to the rear fuselage, wing droop enhanced, and upside-down shark fins fitted beneath the horizontal stabilisers. The Yashas' glass cockpit features two large display screens and voice recognition. With certification due to start soon, the IAF will lease four limited-series production Yashas airframes for further evaluation.

The Dhruv Advanced Light Helicopter (ALH) did not participate in Aero India 2025 because India's entire fleet of 330-plus helicopters is grounded pending investigation of a fatal crash in January. In fact, the ALH fleet has suffered 28 crashes in the past 25 years. The Prachand Light Combat Helicopter (LCH) shares some Dhruv components, so it did not fly at Yelahanka either. HAL expects an order for up to 156 LCHs to be lodged this year.

HAL's 3-tonne-class Light Utility Helicopter (LUH) also flew at the Bengaluru exhibition, with up to 400 units eventually required by the Indian Army and IAF. The LUH achieved its maiden flight in September 2016, but series production is yet to proceed – vibration issues, for instance, need to be ironed out.

Aero India 2025 attracted some foreign aircraft – USAF F35As and F-16Cs, a Russian Su-57E, Luftwaffe A400M and Brazilian C-390 – but the show underscored how India has put most of its eggs in the indigenously built basket. Its ambitions are admirable, but unfortunately the result has been incessant delays for the IAF. **afm**

For more from Aero India see Showbiz, p90-91

Several Light Utility Helicopters from HAL were present at Aero India 2025. This was the third prototype of the LUH built, but a formal order from India's military is yet to be lodged

The HTT-40 is a basic trainer aircraft produced by HAL. The type first flew in 2016, and this example is the second prototype. The first production examples are yet to reach the Indian Air Force

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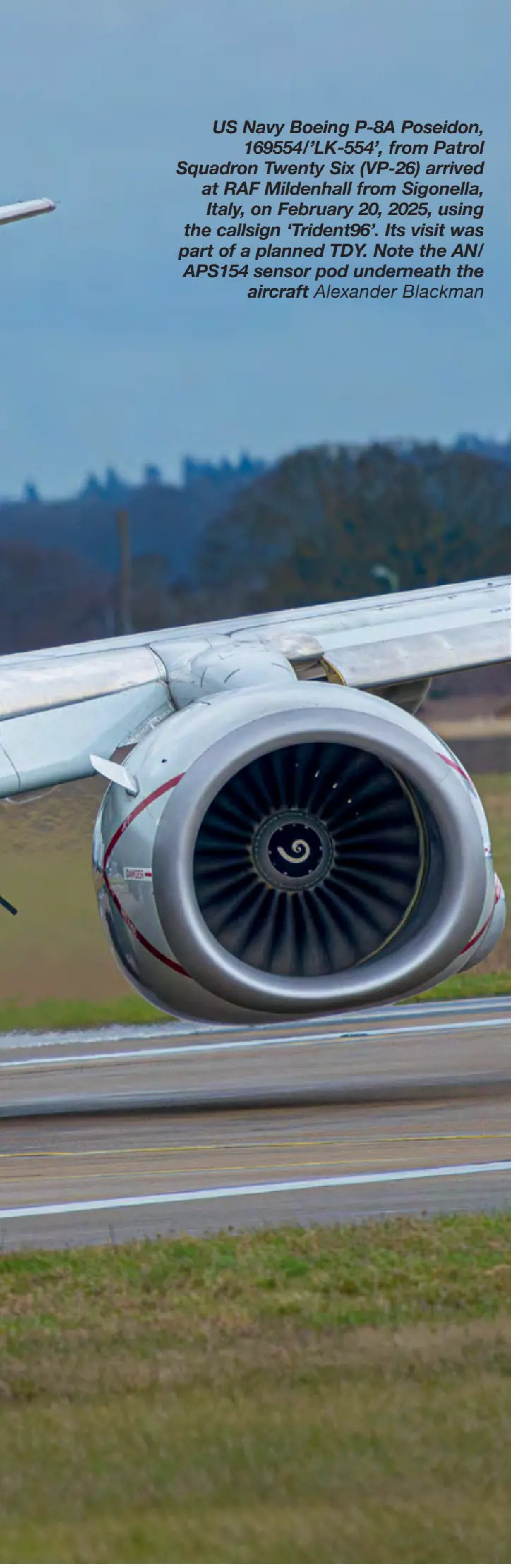
342/25

Just Passing Through

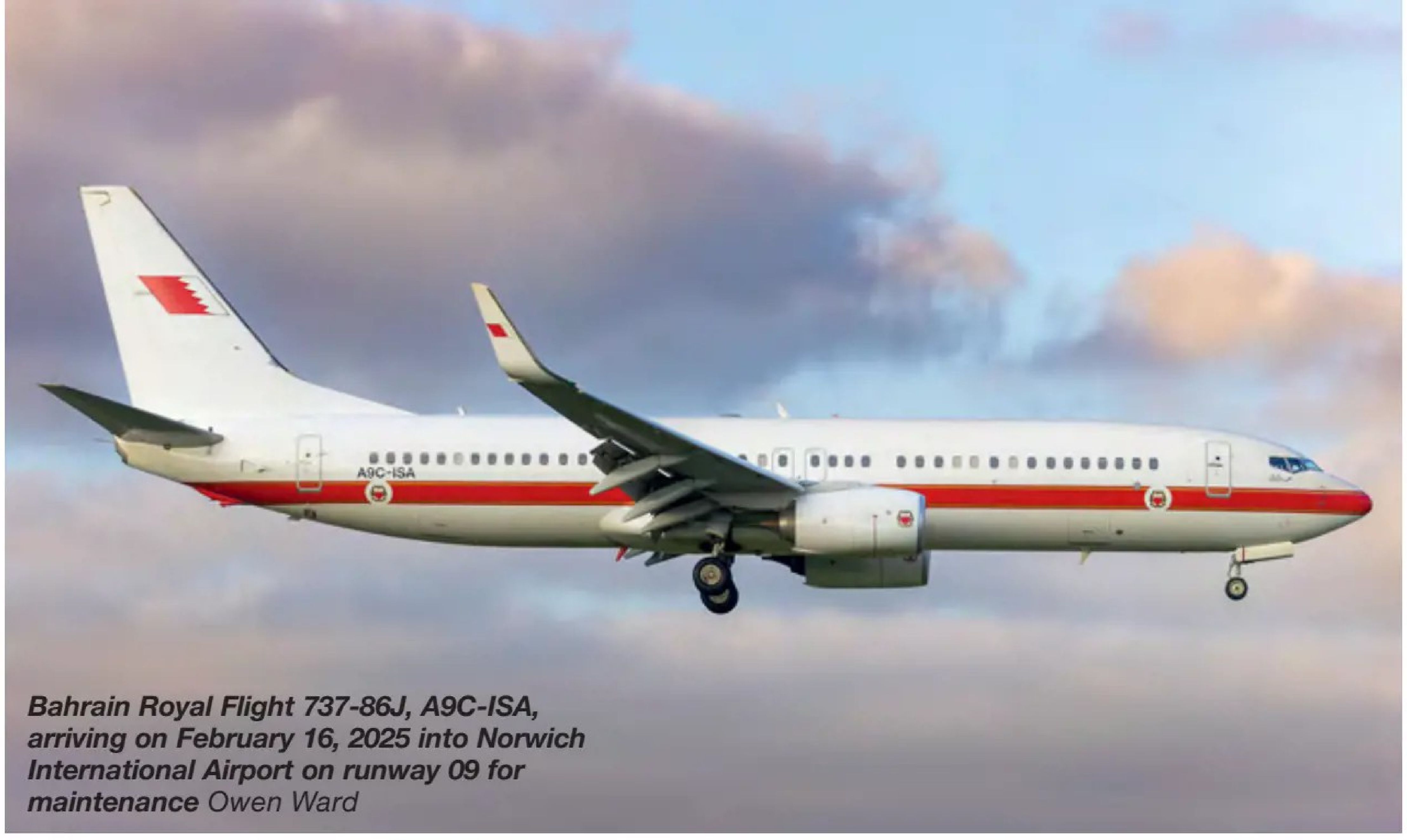
Ben Stanley Hall showcases the rich diversity of aircraft movements up and down the UK

While Exercise Cobra Warrior has provided us with some interesting movements from its participants as well as its support aircraft, there are still plenty of other movements around the UK. This month, we have a couple of US aircraft at one of the regular locations, RAF Mildenhall, plus another at Cardiff Airport in Wales. Then a slightly less regular location, RAF Brize Norton, hosts with an Omani VIP aircraft, as well as an Italian C-130J at Leuchars Aerodrome and a Bahraini 737 at Norwich Airport.

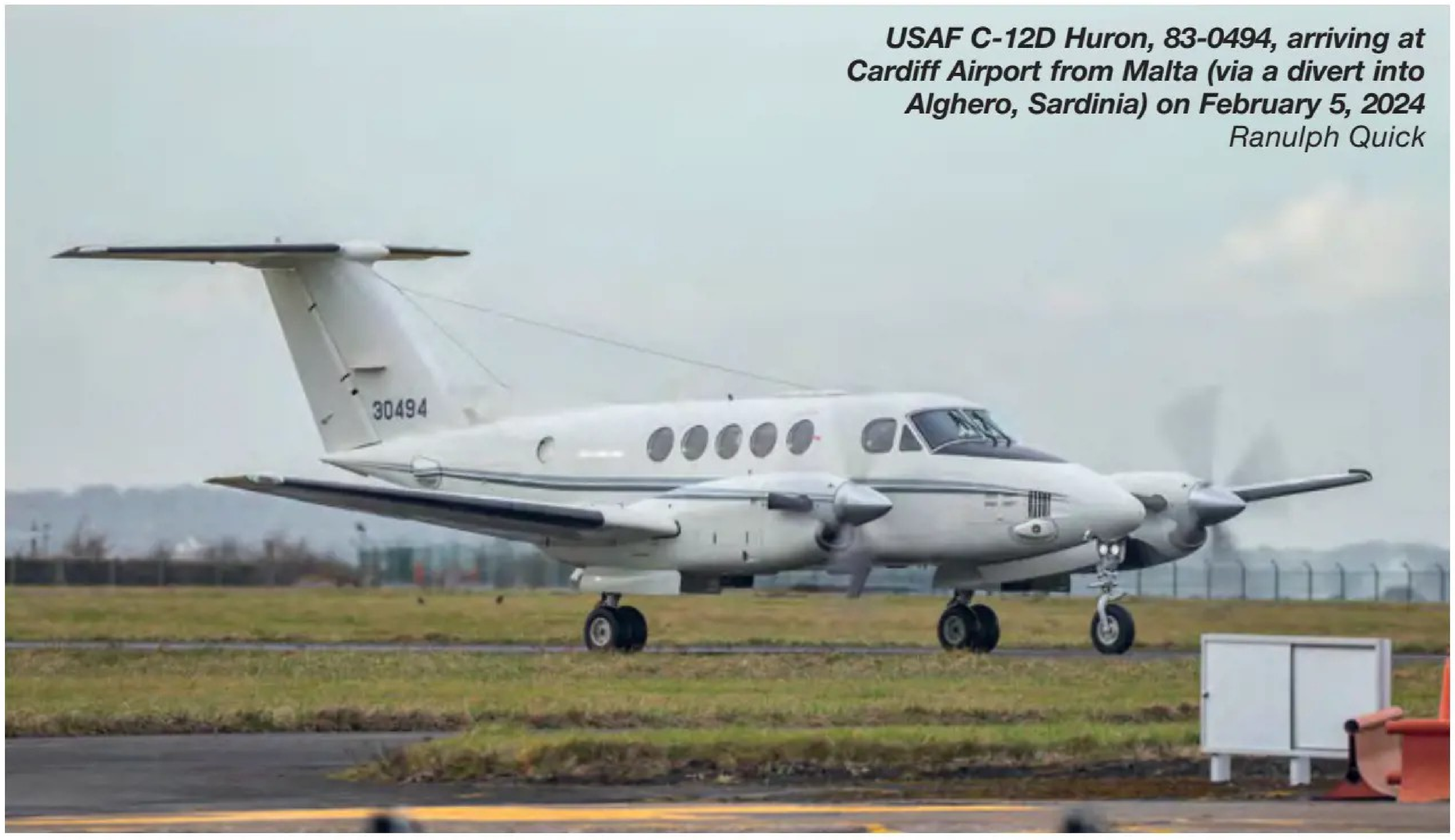
We welcome contributions from readers across the world. If you photograph an aircraft that is not in its usual location or could be of interest, please email your images, without watermarks, to ben.hall@keypublishing.com using the subject heading 'Just Passing Through', with a short caption including as much information as possible. **afm**



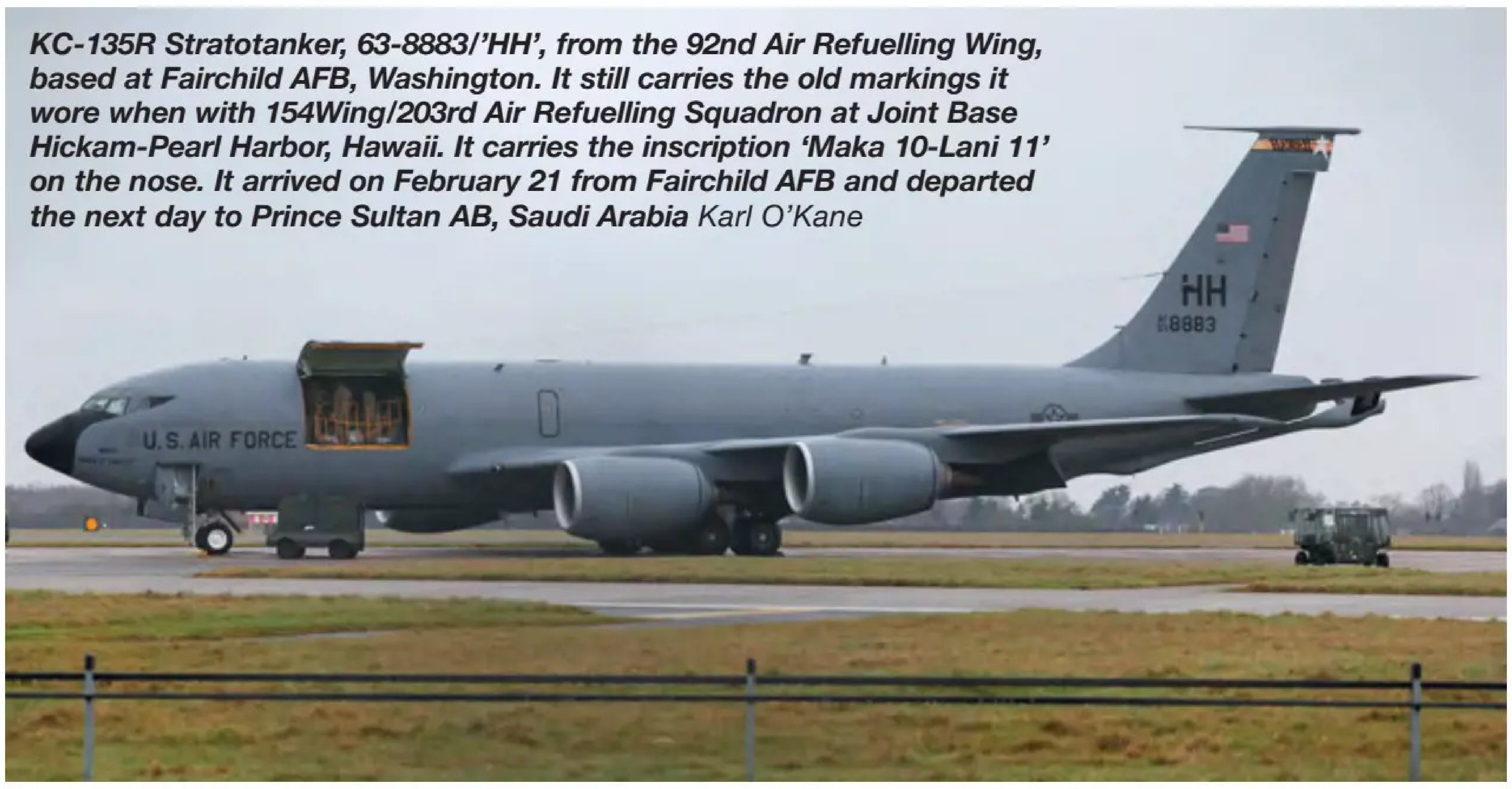
US Navy Boeing P-8A Poseidon, 169554/'LK-554', from Patrol Squadron Twenty Six (VP-26) arrived at RAF Mildenhall from Sigonella, Italy, on February 20, 2025, using the callsign 'Trident96'. Its visit was part of a planned TDY. Note the AN/APS154 sensor pod underneath the aircraft *Alexander Blackman*



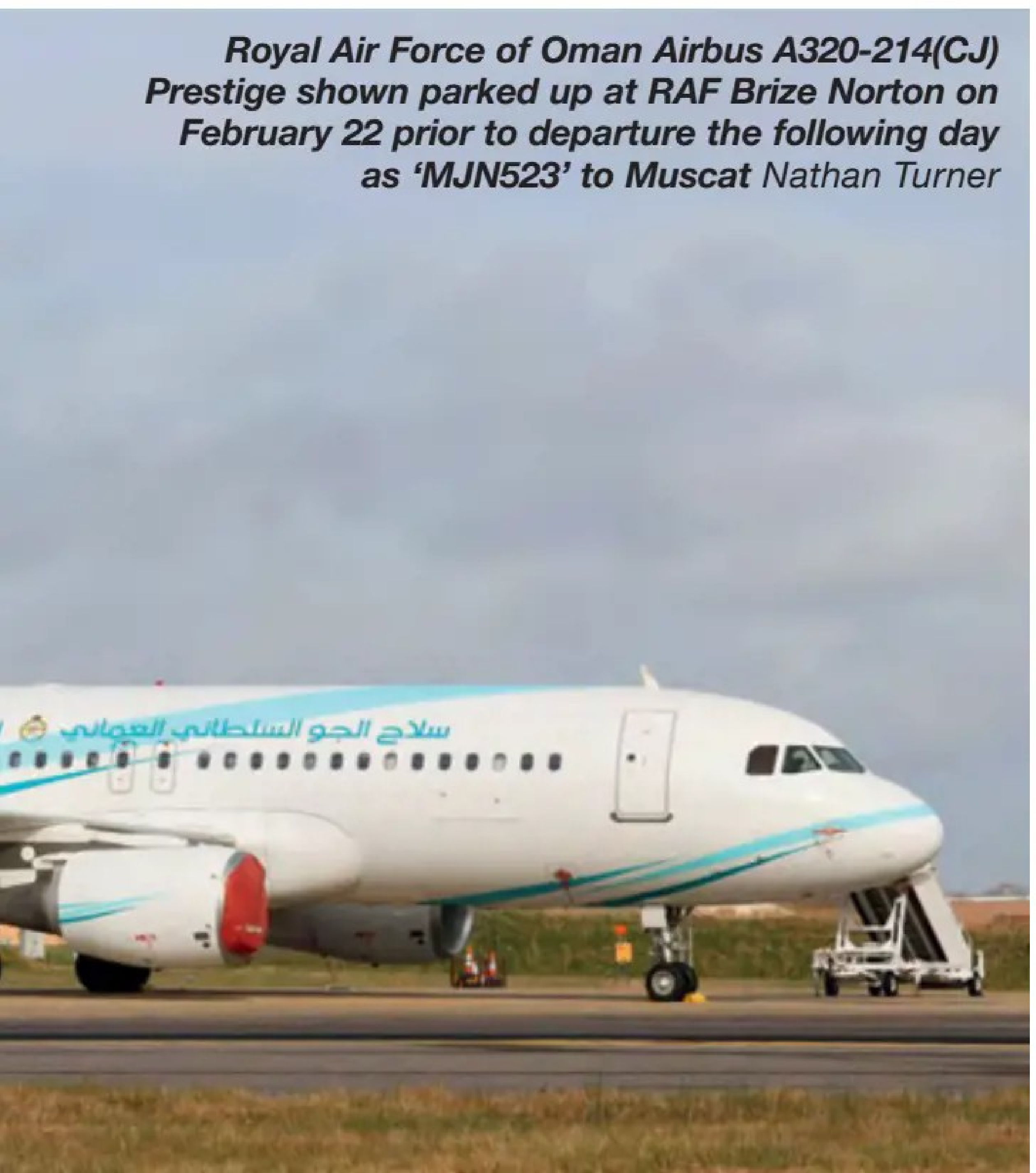
Bahrain Royal Flight 737-86J, A9C-ISA, arriving on February 16, 2025 into Norwich International Airport on runway 09 for maintenance *Owen Ward*



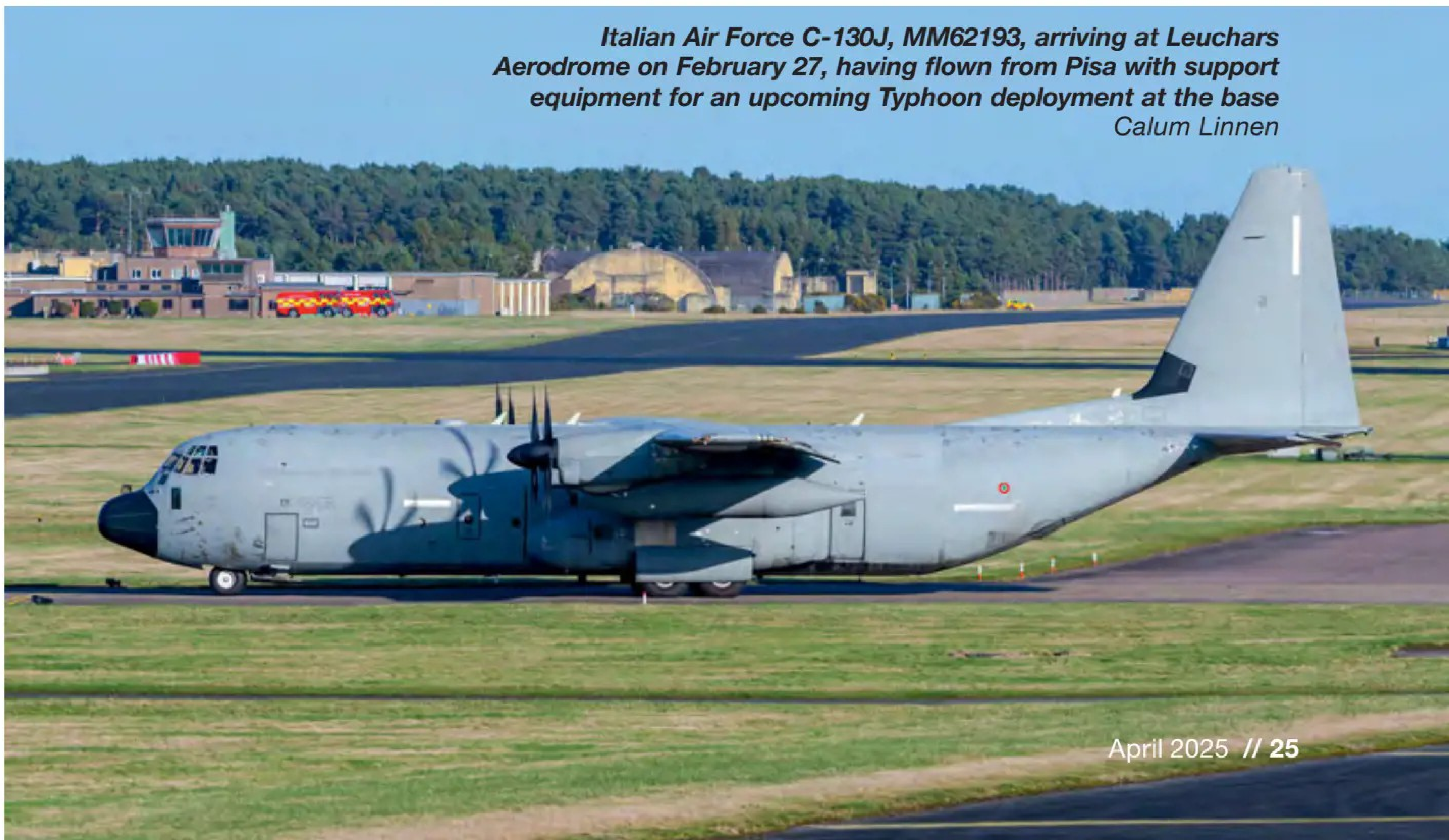
USAF C-12D Huron, 83-0494, arriving at Cardiff Airport from Malta (via a divert into Alghero, Sardinia) on February 5, 2024 *Ranulph Quick*



KC-135R Stratotanker, 63-8883/'HH', from the 92nd Air Refuelling Wing, based at Fairchild AFB, Washington. It still carries the old markings it wore when with 154Wing/203rd Air Refuelling Squadron at Joint Base Hickam-Pearl Harbor, Hawaii. It carries the inscription 'Maka 10-Lani 11' on the nose. It arrived on February 21 from Fairchild AFB and departed the next day to Prince Sultan AB, Saudi Arabia *Karl O'Kane*



Royal Air Force of Oman Airbus A320-214(CJ) Prestige shown parked up at RAF Brize Norton on February 22 prior to departure the following day as 'MJN523' to Muscat *Nathan Turner*



Italian Air Force C-130J, MM62193, arriving at Leuchars Aerodrome on February 27, having flown from Pisa with support equipment for an upcoming Typhoon deployment at the base *Calum Linnen*

Why would “only an idiot” buy the F-35?

When Donald Trump threatened to unleash maverick ‘Tech Bro’ Elon Musk on the Pentagon, many of the US military’s top brass must have been shaking their heads in despair. Top of the Tesla and Space X owner’s hit list is reported to be the Lockheed Martin F-35 Lightning II combat jet. **Tim Ripley** looks at what this could mean for the world’s largest military aircraft programme and Britain’s plans to buy more jets.

In the days and weeks after President Trump’s inauguration on January 20, a revolution was under way across the US Federal Government. Contingents of ‘20 something’ computer experts and hot-shot programme managers have been spreading out across Washington DC to audit spending, in a drive to root out waste and ‘woke’. They work for the so-called Department of Government Efficiency, or DOGE, headed up by South African-born businessman Elon Musk.

Thousands of US government workers have found themselves out of their jobs and whole organisations have been closed, as Musk and his so-called “Musketeers” have cut a swathe through layers of bureaucracy. In February, President Trump revealed that Musk would soon be heading to the Pentagon to sort out billions of dollars of waste in military spending.

The former US President Dwight D Eisenhower famously coined the term “military industrial complex” to describe the nexus of political power and money at the heart of the Pentagon.

For decades, the generals in the Pentagon, backed up by a phalanx of defence contractors, have managed to fight off repeated attempts to slim down the US military’s bureaucracy and bloated budget. No matter how many scandals concerning $1,000 spanners, ships that can’t go to sea and aeroplanes that don’t work, it has proved almost impossible to reduce Pentagon spending, which now runs at more than $800bn a year. This has no doubt been helped by the US ‘pork barrel’-based procurement politics, where defence plants and military bases are spread around the country making congressmen and senators unwilling to vote to make their constituents unemployed.

The epitome of the broken US procurement system is the F-35. More than 25 years since the project – then known as the Joint Strike Fighter – was born, it has missed almost every development milestone, projected costs have ballooned to more than 1.5 trillion dollars and a costly upgrade effort has stalled.

Enter Musk

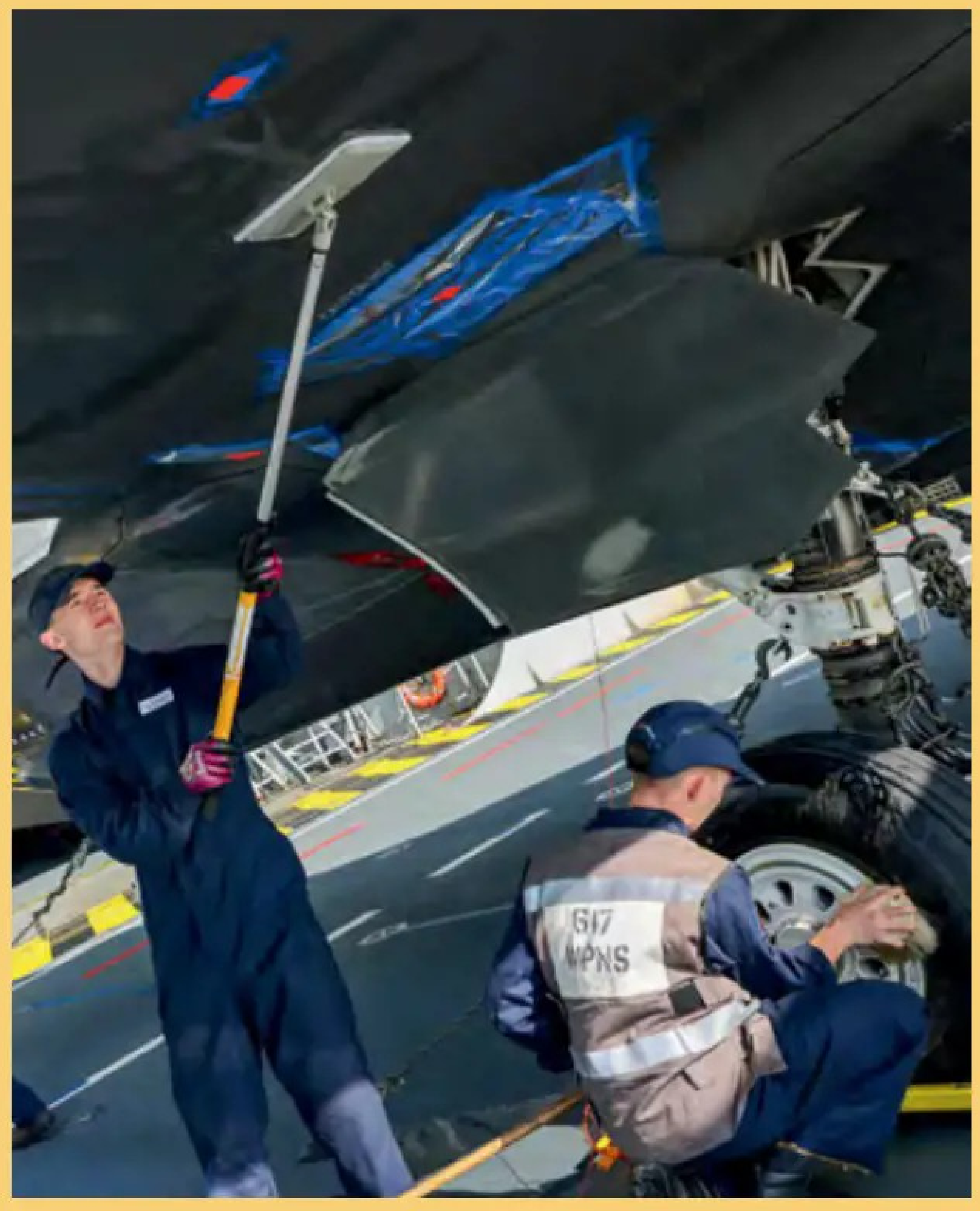
America’s military industrial complex has never faced an opponent like Musk. The owner of X

Right: ***Lockheed Martin’s Fort Worth plant in Texas is the centre of the F-35 programme***
Lockheed Martin

The UK has taken delivery of 34 F-35Bs since 2012
MOD/Crown Copyright

Italy is buying the F-35B for use on its aircraft carriers
Lockheed Martin

The Royal Navy and Royal Air Force operate the F-35B off Queen Elizabeth-class aircraft carriers
MOD/Crown Copyright



Above: ***The F-35's unique stealth coatings require a lot of TLC to ensure they remain at peak efficiency***
MOD/Crown Copyright

Below: ***F-35Bs of the UK Lightning Force are operated in joint Royal Air Force and Royal Navy squadrons***
MOD/Crown Copyright

(formerly Twitter), Tesla and Space X cannot be dismissed as an 'ill-informed' politician with an axe to grind. He is the owner of multi-billion-dollar social media, electric car and space companies, so knows a thing or two about running advanced technology projects, on time and on budget. His fans say he combines the qualities of Tony Stark from the Marvel Universe and Bruce Wayne from the *Batman* films. His detractors say very unpleasant things about him in response.

More importantly, he has the ear of Trump, who is on a mission to shake up Washington DC. Musk is aided in this effort by a group of other tech entrepreneurs – such as Peter Thiel, the founder of PayPal and the artificial intelligence (AI) company, Palantir – who want to supplant the traditional defence companies, such as Lockheed Martin, Boeing and Northrop Grumman, as the Pentagon's main suppliers. Thiel is close confidant of US Vice-President JD Vance, so he is also well connected in the White House. Trump's National Security Advisor, Mike Waltz, summed up the view in the White House on Pentagon waste in a February 9, 2025 post on X: "Everything there seems to cost too much, take too long and deliver too little to the soldiers… The American people have said 'enough' to the bloat and the waste."

The F-35 programme epitomises everything that Musk, Waltz and Theil hate about the Pentagon. It's big, expensive and has not kept up with today's threats, so they say. Last November, Musk publicly took aim at the F-35 in his now infamous post on X. Alongside a video clip of a swarm of drones, flying in perfect formation, Musk wrote: "Meanwhile, some idiots are still building manned fighter jets like the F-35," adding: "Manned fighter jets are obsolete in the age of drones anyway. Will just get pilots killed.

"The F-35 design was broken at the requirements level, because it was required to be too many things to too many people," said Musk, calling it "an expensive (and) complex jack of all trades, master of none".

F-35 already in trouble

Musk's comments prompted a great deal of push-back from supporters of the F-35 and manned fighter jets: the time is not right to junk human pilots and AI is not ready to go to war, they said in the run-up to the arrival of Trump in the White House.

Pentagon and US Air Force chiefs were strangely quiet in this debate. They seemed not to want to antagonise Musk or the new president and his team. More importantly, they know the F-35 programme is troubled by efforts to field a new variant, known as the Technology Refresh 3 (TR3)/Block 4 upgrade.

This multi-billion-dollar project was meant to be a great leap forward in F-35 capability, allowing a new generation of weapons and sensors to be fielded on the jet. The F-35 is the ultimate software-driven combat aircraft. Every aspect of the aircraft is controlled by a unique computer operating system, which allows various software applications that drive its radars, weapons, mission planning and the flight control systems. It is akin to the 'plug and play' installation of new apps on a mobile phone or home PC, but several thousand times more complicated and involving flight critical systems. Crucially, there are no manual back-up systems. If the operating systems and the apps don't work, then the aeroplane can't fly or fight.

Above: **HMS Prince of Wales is heading to the Far East later this year as the flagship of the Carrier Strike Group 2025 deployment** *MOD/Crown Copyright*

Above right: **RAF Marham in Norfolk is home to the UK Lightning Force** *MOD/Crown Copyright*

Right: **The US Marine Corps is the largest operator of the F-35B** *US DoD*

As with all home PCs or other computer systems, eventually they run out of hard drive space and the computer slows down as the apps running on it get too big. This happened to the F-35 a decade ago, so Lockheed Martin and the Pentagon's F-35 Joint Program Office (JPO) produced a plan to transition from the TR2 airframe to the TR3. This essentially involved the replacement of the aircraft's computer and its operating system to allow so-called Block 4 software apps to run on it. These would allow a whole suite of new sensors, including a new APG-85 radar, new electronic warfare, a next-generation defensive aid suite and new weapons to be integrated on the jet, including the enhanced AGM-153C-1 Joint Stand-off Weapon, GBU-53/B Stormbreaker, internal carriage of AIM-9X Sidewinder and AIM-120 AMRAAMs. This is not just as simple as replacing a few black boxes. The new computer is far more power hungry so generates a load more heat. As a result, it needs a lot of extra cooling to ensure the jet's heat signature does not grow out of control, compromising its 'stealth' features.

After several years of work, the TR3/Block 4 project hit major snags in 2022 and a year later the JPO pulled the plug, ordering Lockheed Martin to stop delivering jets to US and overseas customers. Crucially, it was deemed that the new operating system was just not stable enough to safely fly the aircraft or control its sensors and weapons. It took Lockheed Martin a year to solve some of the problems and clear the aircraft to fly, but only during training. The weapons and sensor software were not for use during live combat missions.

In the summer of 2024, the JPO allowed deliveries to resume, but the new TR3/Block 4 jets were specifically excluded from any combat missions. This allowed the backlog of more than 100 jets that had been stored at Lockheed Martin's Fort Worth plant in Texas to start to be delivered.

The TR3/Block 4 project is nowhere near out of the woods yet. In January 2025, the Pentagon's Operational Test & Evaluation watchdog reported that the testing of the new software would not be completed until "mid to late 2026" at the earliest. Only then could the actual work to integrate any new capabilities begin, suggesting that it could be four or five years until new weapons and sensors will appear on the F-35.

If this was not a big enough problem, Lockheed Martin discontinued building the old TR2 aircraft back in 2022, so only TR3/Block 4 configured airframes – which cannot be used in combat – are coming off the Fort Worth line, at more than 100 jets a year. The supply chain for TR2 components has been closed down, meaning there is no chance of switching back to the older variant that is combat capable. So, unless Lockheed Martin and the JPO make a major breakthrough in cracking the problems with the TR3/Block 4, none of the new build aircraft will be able to go to war until the back end of this decade.

The US customers – USAF, US Navy and US Marine Corps – have already indicated that they want to slow deliveries of new build F-35s and backload the ramping up of

617 squadron became the first operational UK F-35B unit in April 2018 at Marine Air Corps Station Beaufort in South Carolina before it relocated to RAF Marham two months later *MOD/Crown Copyright*

procurement out beyond 2030, but this places export customers in a pickle.

Given the huge costs involved, as each F-35 costs just under $100m, it is not surprising that this debacle has thrown an additional spotlight only on the poor performance of the F-35 programme. This is an open goal for critics, led by Musk.

Global F-35 operators and TR3/Block 4

The impact the TR3/Block 4 issue is having on air arms around the world is very different. Least affected is the US military, which currently has around 800 F-35s in service, the vast majority of which are TR2 variants. So, the USAF, US Navy and US Marine Corps have a sizeable fleet of combat capable jets. They are able to juggle their fleets to ensure that enough jets are available to forward deploy to crisis zones around the world.

The Level 1 to Level 3 customers – the UK, Australia, Italy, Norway, Netherlands and Denmark, as well as Japan and South Korea – now have mixed fleets of TR2 and TR3/Block 4 variants. They have around half to three-quarters of TR2 aircraft, so can field sizable F-35 contingents on operational missions.

They are having to allocate their TR3/Block 4 airframes to pilot training and non-operational tasks.

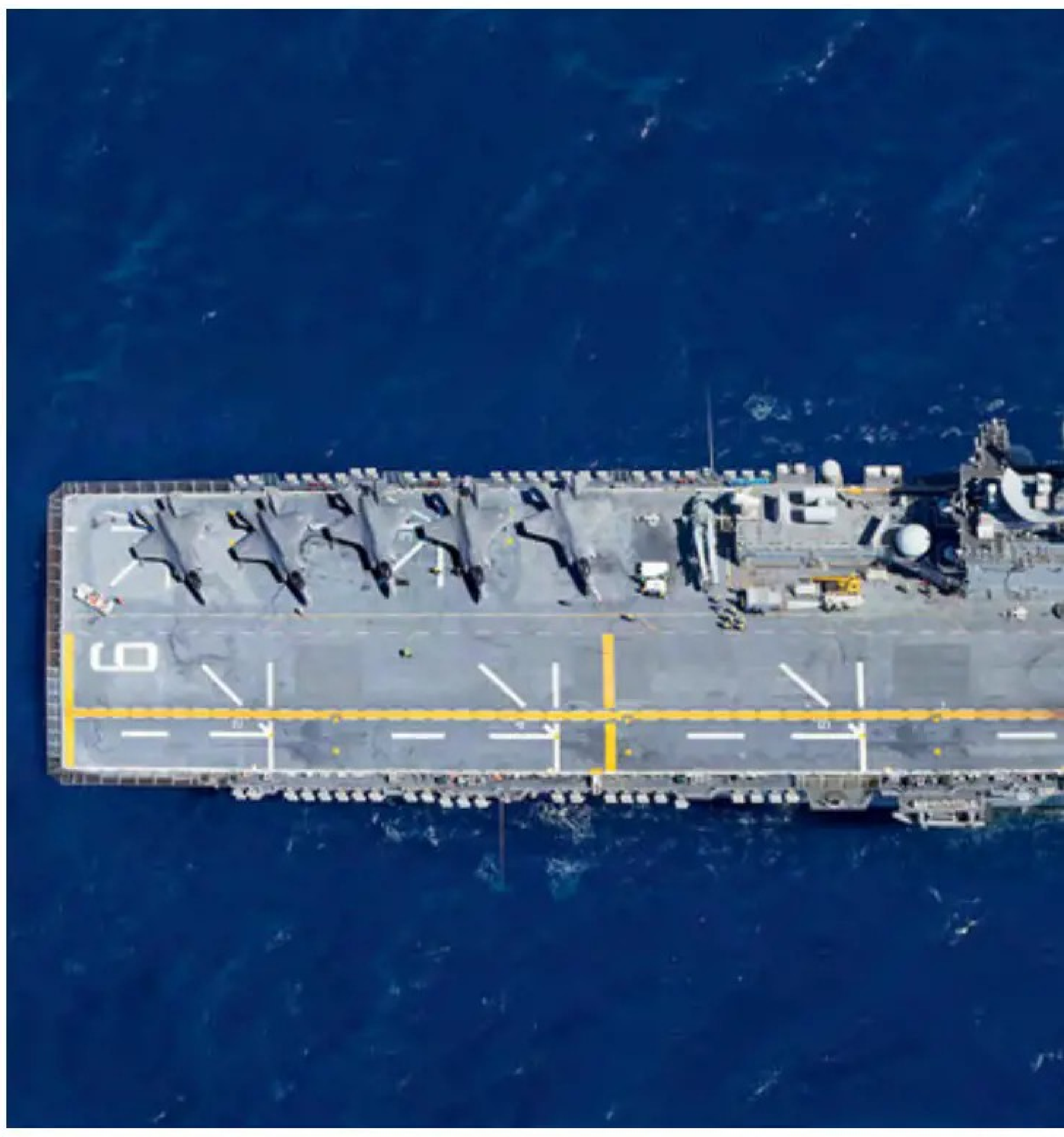
The biggest problem is for the air arms that only signed up to buy jets after 2020 and who were due to receive TR3/Block 4 airframes from mid-decade. These air arms – Belgium, Canada, Czech Republic, Finland, Germany, Greece, Poland and Switzerland – are starting to receive their first aircraft and are finding they have major limitations on what they can do and the weapons integration options available.

Not surprisingly, they are reportedly very unhappy at the situation and the reputation

Left: ***The UK announced in 2012 that it wanted to buy a first batch of 48 jets and is in the process of negotiation to buy a second batch of 26 F-35Bs*** *MOD/Crown Copyright*

Below left: ***The F-35 requires intensive maintenance from highly trained ground crew*** *MOD/Crown Copyright*

Below: ***The US Marine Corps operates F-35Bs from US Navy amphibious assault ships*** *US DoD*



of the JPO and Lockheed Martin has taken a big knock. Heavy US government pressure has quelled this disquiet, but *AirForces Monthly* has heard that some customers have asked to put their aircraft further back in the production run so there is a better chance that the TR3/Block 4 problems are cleared up.

Britain's F-35 dilemma

For the British Ministry of Defence, the trials and tribulations of the F-35 programme could not have come at a worse time. The dilemmas faced by the Royal Air Force and Royal Navy are similar to those faced by the Tier 2 and 3 customers, to varying degrees.

By the end of 2024, the UK had taken delivery of 34 TR2 jets, and 13 TR3/Block 4 jets are still on order, with delivery due during 2025. This means that out of the UK fleet of 47 jets, only three-quarters will be combat capable for two to four years. The UK MOD described the TR3/Block 4 jets as having a "robust training capability" and the presence of the jets at RAF Marham, Norfolk, will allow operational conversion of new pilots to the F-35B to take place. As bottlenecks in the training pipeline have been a major problem for the RAF and RN in growing their pool of qualified pilots, this will be very welcome.

The problem comes in generating combat capability, particularly to embark jets on the Queen Elizabeth-class aircraft carriers. In the summer, HMS *Prince of Wales* is due to sail to the Far East to demonstrate the full operating capability (FOC) of the UK's carrier strike project. The key metric was to put 24 jets on HMS *Prince of Wales* for the Carrier Strike Group 2025 deployment, but with only 34 TR3 variants available, this is proving a difficult ask, particularly as a significant number of jets are needed to help train the next generation of pilots or if they are undergoing maintenance at any point in time.

Three early configuration British F-35Bs remained in the United States as part of the combined US-UK test force. These are in the process of having their instrumentation stripped out to allow them to join the operation pool at RAF Marham from 2026, which will mean 33 jets will be available for use by the frontline units, 617 squadron and 809 NAS, over the next year. One late production TR2 British F-35B, ZM165, remains in the US for testing duties.

There is an added problem for the UK from the TR3/Block 4 saga that has still to play out. Britain had hoped to field the MBDA SPEAR 3 stand-off air-to-ground missile and MBDA Meteor beyond visual range missile on its F-35Bs by 2028. The weapons are part of the suite of capabilities that are under the umbrella of the TR3/Block 4 project, so its delay is preventing the start of work on the integration of the British weapons. The UK MOD now says the "integration time lines are not yet to be confirmed", indicating it does not know when RAF and RN F-35Bs will have the British weapons available.

Back when Britain formally joined the programme in 2001, it was envisaged that 138 aircraft would be bought for the Royal Navy and Royal Air Force. In US-jargon this became the British 'program of record', but this has no legal force and to date the UK defence ministry has only contracted to buy 48 jets. Negotiations are under way for Britain to buy a second batch of 26 jets, but this is part of the on-going Strategic Defence Review. The price tag of £4 billion means this is not something that is being waved through on the nod. Britain's economic crisis is putting a major strain on government finances, so advocates of the F-35 have had to go head-to-head against supporters of the BAE Systems Tempest, or Global Combat Aircraft Programme (GCAP). Some sources suggest that it is down to an 'either-or' decision between the two aircraft because Britain can't afford both projects.

The TR3/Block 4 debacle is a major problem for supporters of the F-35s. Why invest more money in the aircraft when the manufacturer cannot come up with a date for when they expect it to be fixed? Well, that is what GCAP supporters say. The fight between F-35 and GCAP looks like being long and bitter.

Uncertain future

As Elon Musk gets to work on his audit of the Pentagon's budget, the senior management of Lockheed Martin must be starting to get worried. The defence company donated $1m to President Trump's inauguration committee to pay toward the celebrations marking his return to the White House.

Given that the F-35 is potentially a two-trillion-dollar programme if it is allowed to continue, then that investment will be worthwhile if it keeps the F-35 programme alive. Musk's badmouthing of the F-35 suggests the battle to keep the F-35 in production will be bloody, with no one taking any prisoners. **afm**

Above: ***More than 1,000 F-35s have been built and delivered from Lockheed Martin's assembly line in Fort Worth and from assembly facilities in Japan and Italy*** *MOD/Crown Copyright*

Below: ***Ski jumps on Queen Elizabeth-class aircraft carriers enhance the performance of Royal Navy and Royal Air Force F-35Bs***
MOD/Crown Copyright

A step toward EXTINCTION

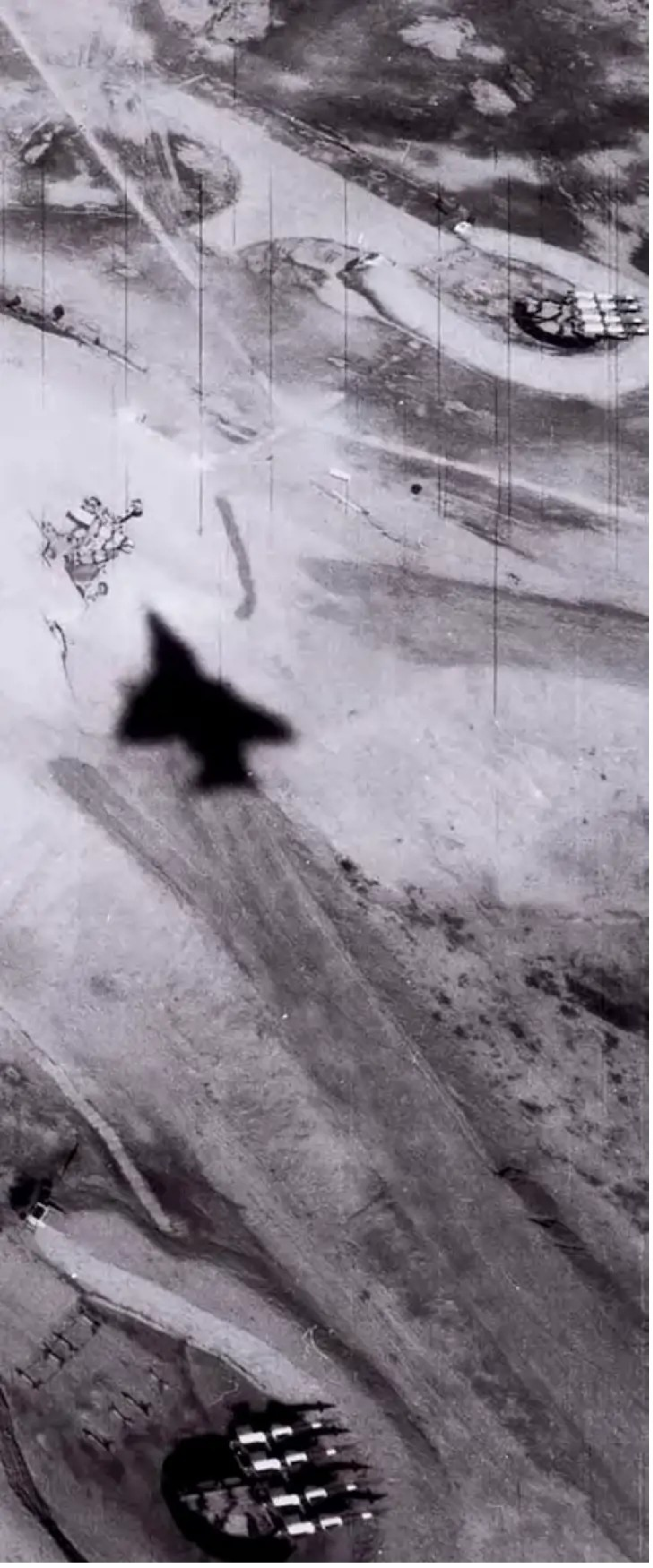
As another RF-4E crashes, **Babak Taghvaee** looks at the role the recce Phantom has played serving the Iranian Air Force's 31st Tactical Reconnaissance Squadron

The RF-4E Phantom II, a reconnaissance variant of the McDonnell Douglas F-4 Phantom II, once served in the air forces of nine countries. Today, it remains operational only within the Islamic Republic of Iran Air Force (IRIAF), which means the 31st Tactical Reconnaissance Squadron (31st TRS), based at the 3rd Tactical Fighter Base (3rd TFB) at Kabudarahang, near Hamedan, is the last remaining unit flying RF-4Es. However, with the recent crash of RF-4E (2-6510) on January 22, due to a technical failure, there are now only four operational with the squadron.

The world's last RF-4 squadron,

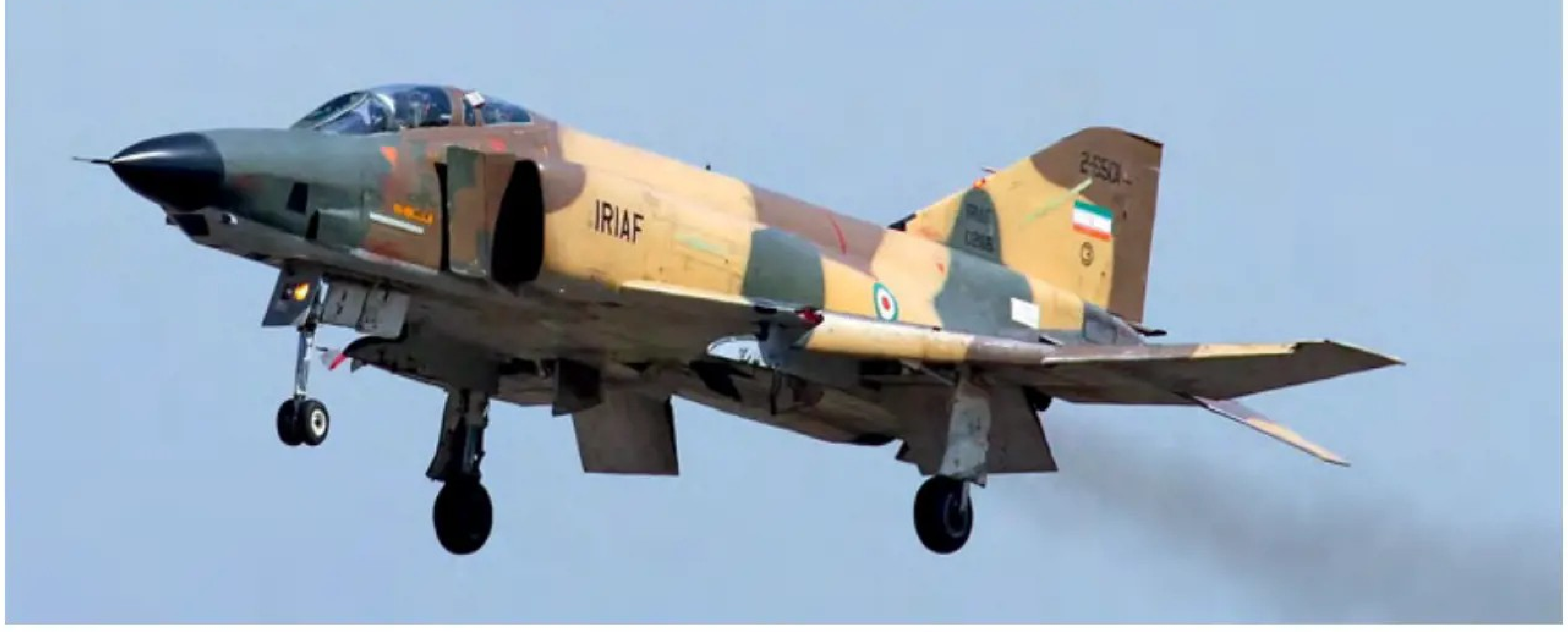
On March 9, 2020, the JASDF officially disbanded its last RF-4Es. It made the IRIAF the world's last operator of these jets. Based in the 3rd TFB near Hamedan, the 31st TRS has been the sole operator of the RF-4Es in Iran since the summer of 1988. The squadron was formed to absorb the five surviving RF-4E Phantom IIs of the 11th TRS, which had been operating them since 1971. One more RF-4E was later added to the fleet in 1994, but due to a deadly accident involving another aircraft in 2003, the 31st TRS was once again left with five aircraft.

Since its formation, the 31st TRS has had two fully mission-capable (FMC) RF-4Es for

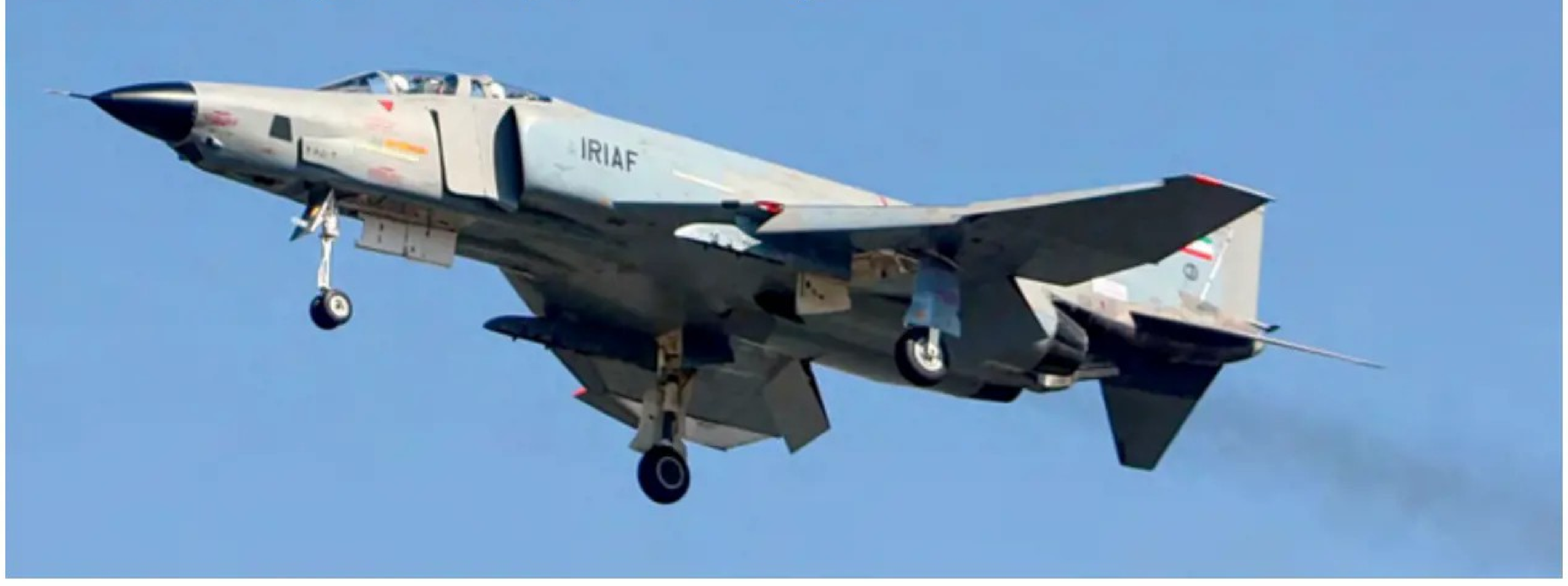


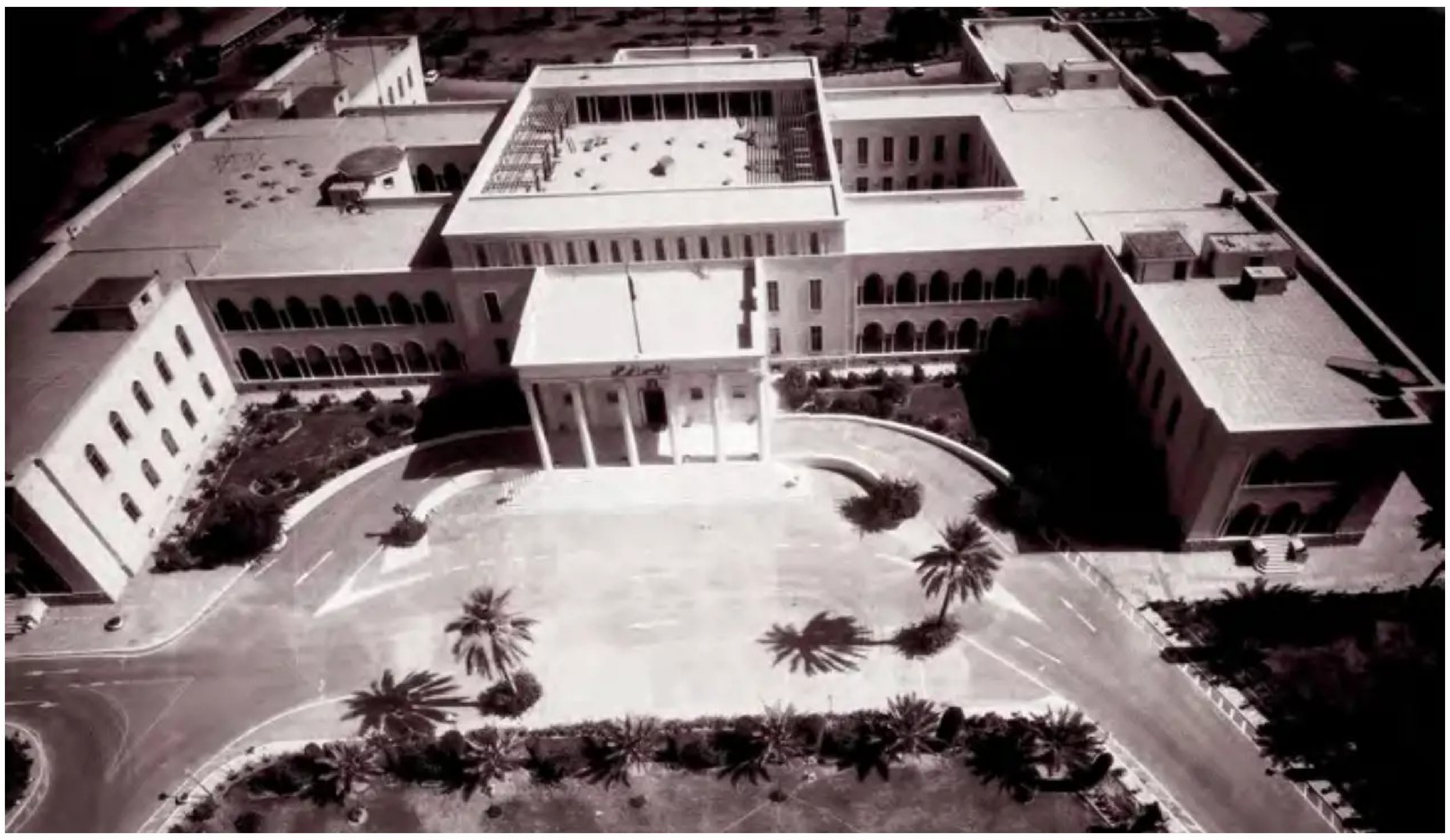
Above: ***Note the shadow of the RF-4E over an SA-3 air-defence battery at Al-Rashid Air Base near Baghdad*** *Author's archive*

The first RF-4E delivered to Iran (2-6501) is seen landing at Mehrabad International Airport with the older J79-GE-17 turbojet engines leaving a trail of smoke behind *Babak Taghvaee*



The only blue coloured RF-4E of the IRIAF landing at Mehrabad International after a post-overhaul functional check flight on February 2, 2009 *Babak Taghvaee*





Right: ***This image taken on October 10, 1980, by an RF-4E crew, shows the building of the Iraqi Parliament in Baghdad*** *Babak Taghvaee*

operational use and one partially mission-capable (PMC) aircraft for pilot training. One aircraft was always under phase maintenance (every 36 months) at the maintenance centre of the 3rd TFB, and another was under programmed depot maintenance (PDM; every 48 months) at Iranian Aircraft Industries (IACI) in Mehrabad International Airport in Tehran. With the restoration of a severely damaged RF-4E in 1995, the 31st TRS had two PMC RF-4Es for training until 2003, when an accident occurred involving one of them.

In the early 1990s, the Department of Self-Sufficiency Jihad-Industrial Research (SSJ-IR) slightly modernised one of the early version RF-4Es of the IRIAF (2-6502) for the purpose of photo-reconnaissance over territorial and international waters for the Iranian Navy. While all of the RF-4Es had an Asian Minor-II camouflage scheme, the specially modified RF-4E was painted blue. This jet underwent modernisation to carry a digital camera for high-altitude photography and received a new U/VHF radio.

At the beginning of 2025, the 31st TRS had only two operational RF-4Es, one grounded RF-4E waiting for spare parts, one decommissioned RF-4E (cannibalised for its parts) and one under PDM in Tehran. On January 22, 2025, one of the two operational RF-4Es crashed near the 3rd TFB due to technical failure. The pilots of the aircraft managed to eject, both sustaining slight injuries.

With the accident last January, the 31st TRS has been left with only four aircraft, making it difficult to undertake its routine missions, particularly those supporting the Iranian Navy. In addition to the four RF-4Es, the IRIAF has eight F-4Ds and 56 F-4Es, with only two-thirds of them being airworthy simultaneously. While the F-4Es of the 31st, 61st and 91st Tactical Fighter Squadrons (TFS) are used for a variety of combat missions, the F-4Ds of the 101st TFS are dedicated solely to front-seat pilot training.

The IRIAF plans to replace the F-4Es of one of its squadrons – the 31st TFS in the 3rd TFB – with Su-35SEs in 2025. The first pair of aircraft was delivered to the IRIAF in December 2024 and are currently being used for ground crew training under the supervision of Russian instructors. By the end of 2025, the 31st TFS will have its F-4Es transferred to the 61st and 91st TFS in the 6th and 9th TFBs, respectively, after receiving 12 Su-35SEs. While the F-4Es will be replaced by the Su-35SEs, there is no replacement planned for the RF-4Es.

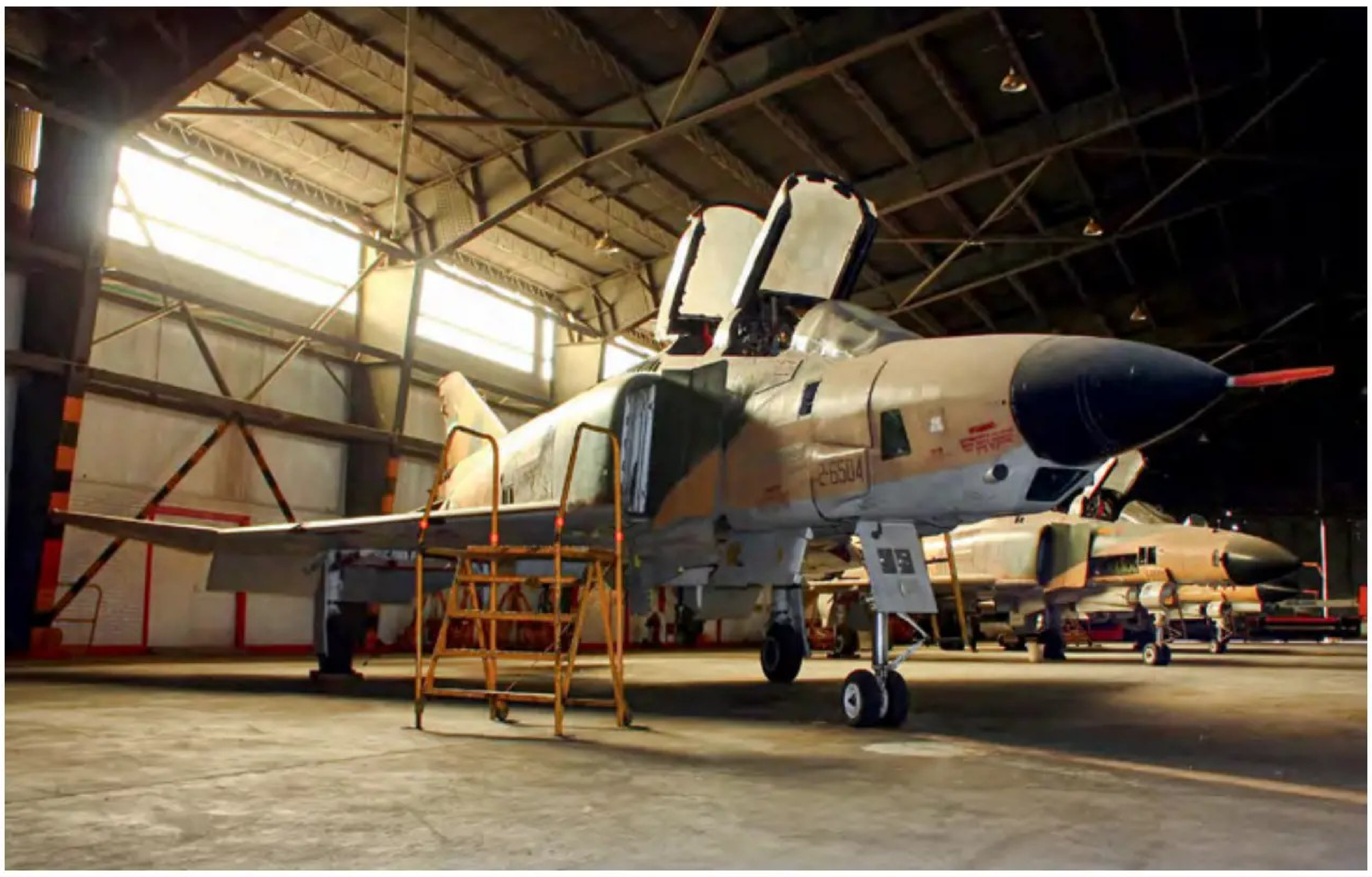
Pre-revolution use of the RF-4Es

Based at the 1st TFB in Tehran, the IIAF's RF-4Es flew missions deep inside the airspaces of regional adversaries and allies of Iraq to photograph military sites, air bases, ports and other strategic locations. The

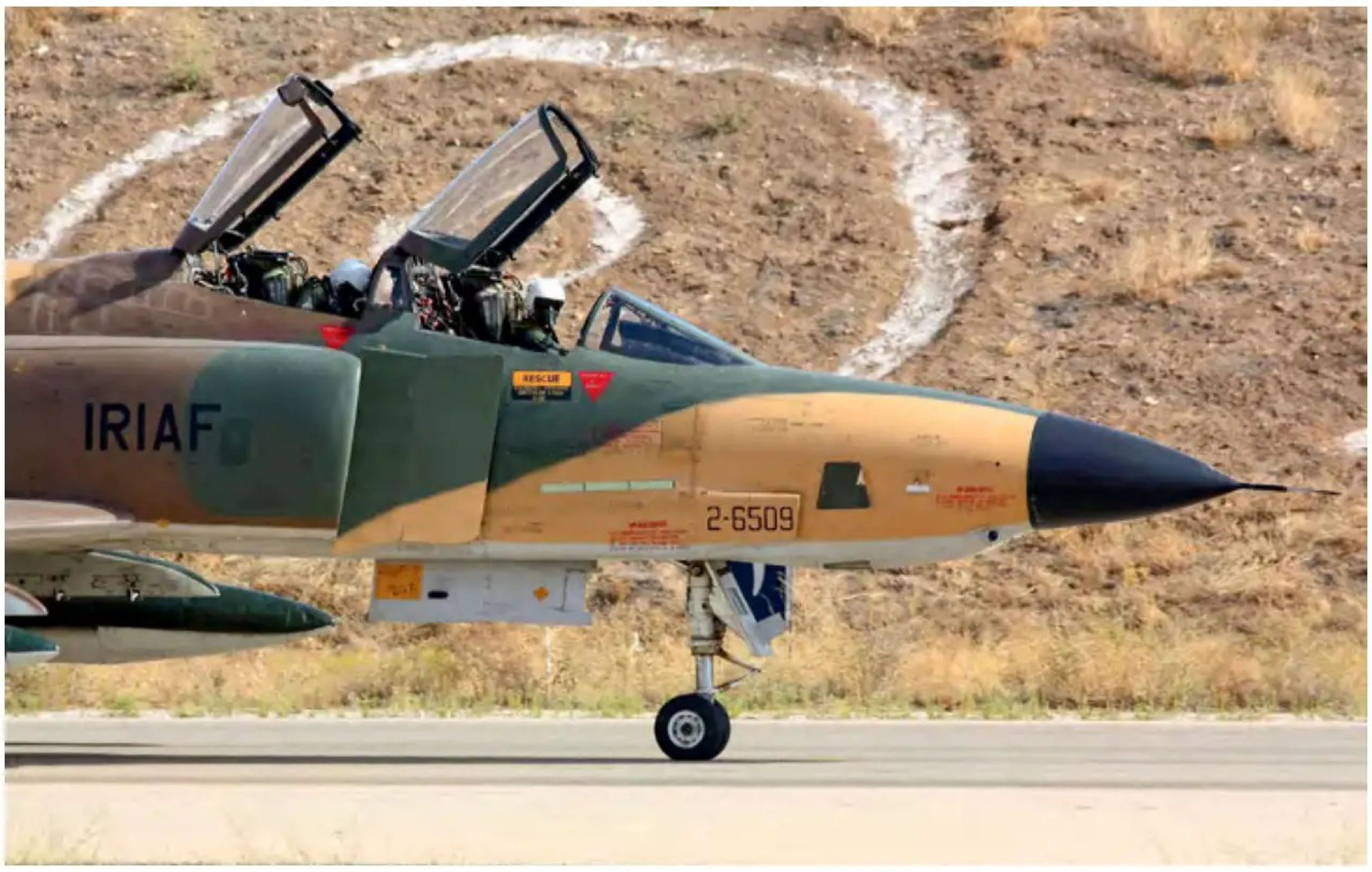
KC-707s (Boeing 707-3J9Cs) and KC-747s (Boeing 747-131Fs) refuelled them en route to their targets, allowing them to fly as far as possible from Iranian airspace in support of Iran's military operations against Soviet-backed communist militias in South Yemen and Oman during the Dhofar War.

The missions flown over Yemen and Oman were performed at low altitudes, with the aircraft carrying two underwing external fuel tanks. Those flown over Iraq were performed at low and medium altitudes, during which the aircraft were equipped with AN/ALQ-101 jammer pods, but had no external fuel tanks to be able to fly as fast as Mach 1.4 to evade Iraqi SAM systems.

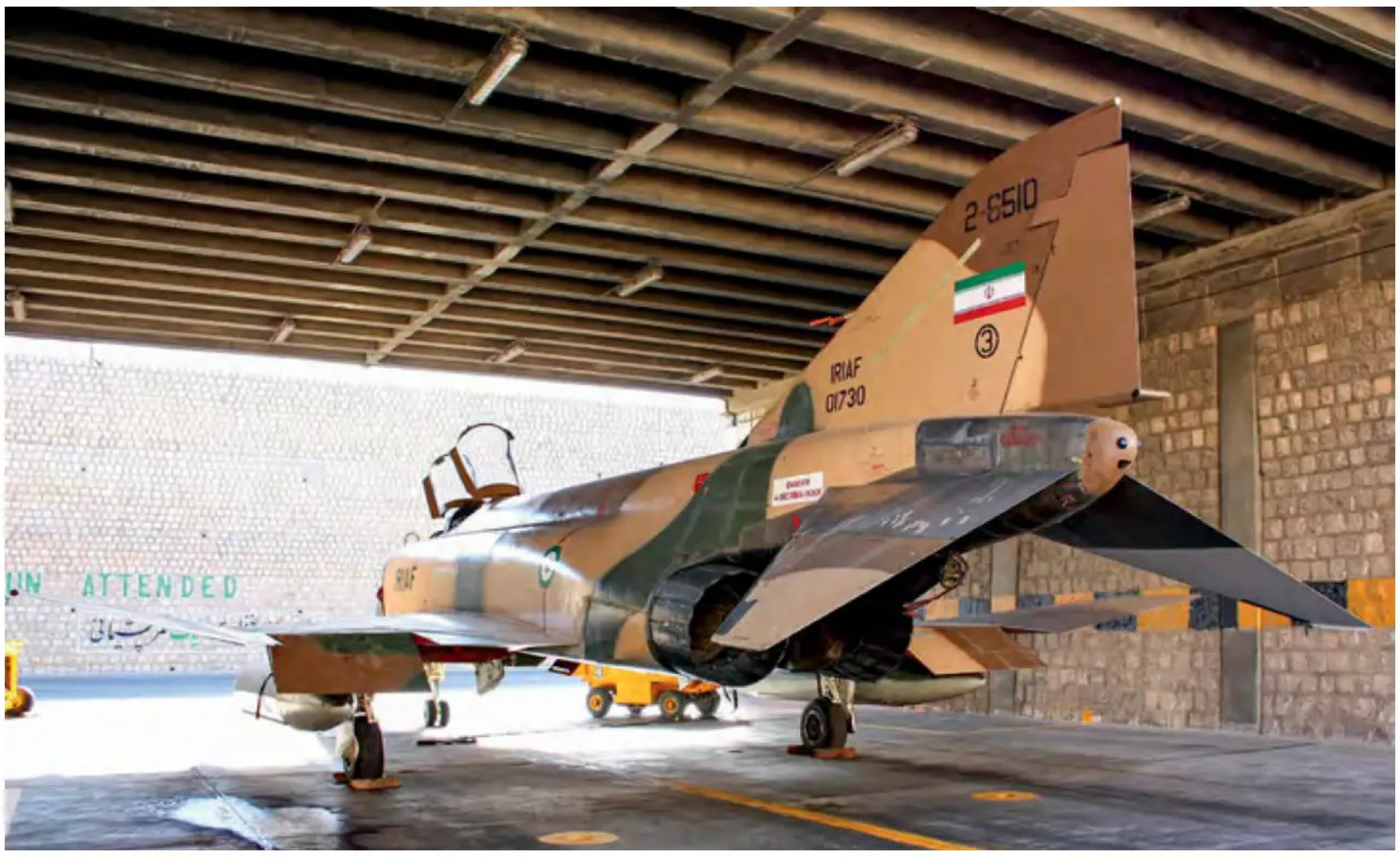
The slower speed of the RF-4Es during their reconnaissance missions over the Dhofar region resulted in the shooting down of one of them (2-6506) over the Oman-South Yemen border on November 24, 1976. The militias of the Popular Front for the Liberation of Oman (PFLO) used a Soviet-supplied 9K32 Strela-2 man-portable shoulder-launched surface-



Left: ***One of the 31st TRS RF-4Es has always been used for cannibalisation for parts for other aircraft*** *Ramin Marali*



Left middle: ***In 2004, this RF-4E (2-6509) was structurally damaged due to heavy landing at 3rd TFB. It was later repaired and brought back to service in 3rd TFB between 2011 and 2013 and seen here in 2014.***

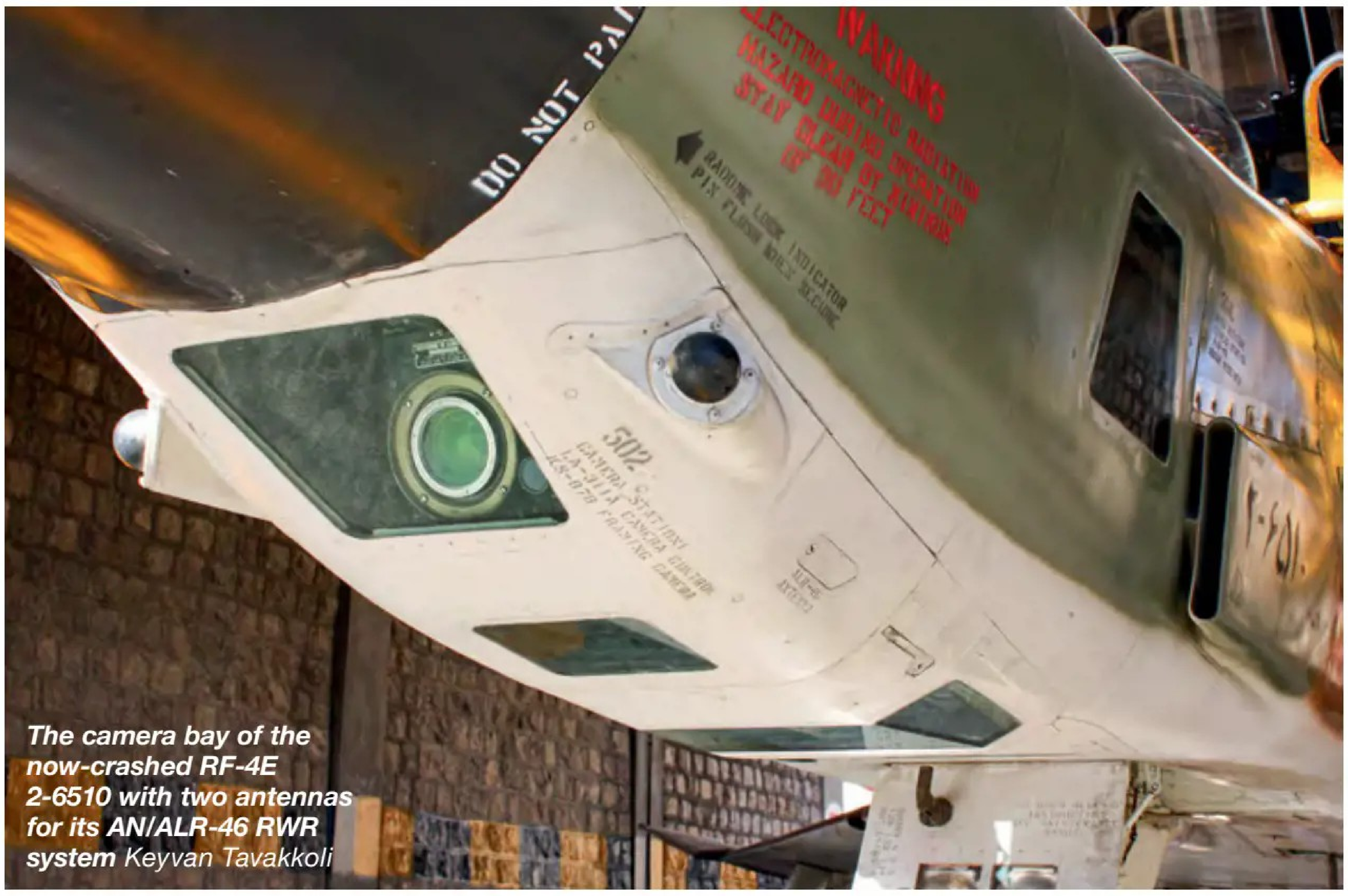


Left bottom: ***This RF-4E 2-6510 of the 31st TRS seen in one of the hardened aircraft shelters at the 3rd TFB, has since crashed*** *Keyvan Tavakkoli*

to-air missile system to strike the aircraft. It crashed on the Yemeni coastline. The pilot, Major Dariush Jalali, was captured by the rebels, who held him for 27 days. Sitting in the rear seat, First Lieutenant Yaghoub Youseffi lost his life after ejecting. Two SUU-23 gun-pod-equipped F-4Ds from the IIAF's 61st TFS were tasked with destroying the wreckage of the RF-4E so the Soviet Navy could not investigate the technology on board. Later, the Iranian Navy recovered the wreckage and its cameras on the coastline of South Yemen.

The enemy's surface-to-air missile systems were not the only threats to the IIAF's RF-4Es during their missions over enemy territory. In 1977 and 1978, as the operations of the RF-4Es over Iraq increased, the Iraqi Air Force made unsuccessful attempts to shoot them down using MiG-21PFM/MF and MiG-23MF/MS fighter jets, mainly due to the high speed of the RF-4Es.

Prior to the fall of the Pahlavi government due to a Soviet-backed Islamo-Marxist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***The camera bay of the now-crashed RF-4E 2-6510 with two antennas for its AN/ALR-46 RWR system** Keyvan Tavakkoli*

No AN/ALQ-119s are in use with the 31st TRS, so the older and less capable ALQ-101s have replaced them. This RF-4E 2-6509 can be seen carrying one of these ECM pods during an exercise at Isfahan

IRIAF
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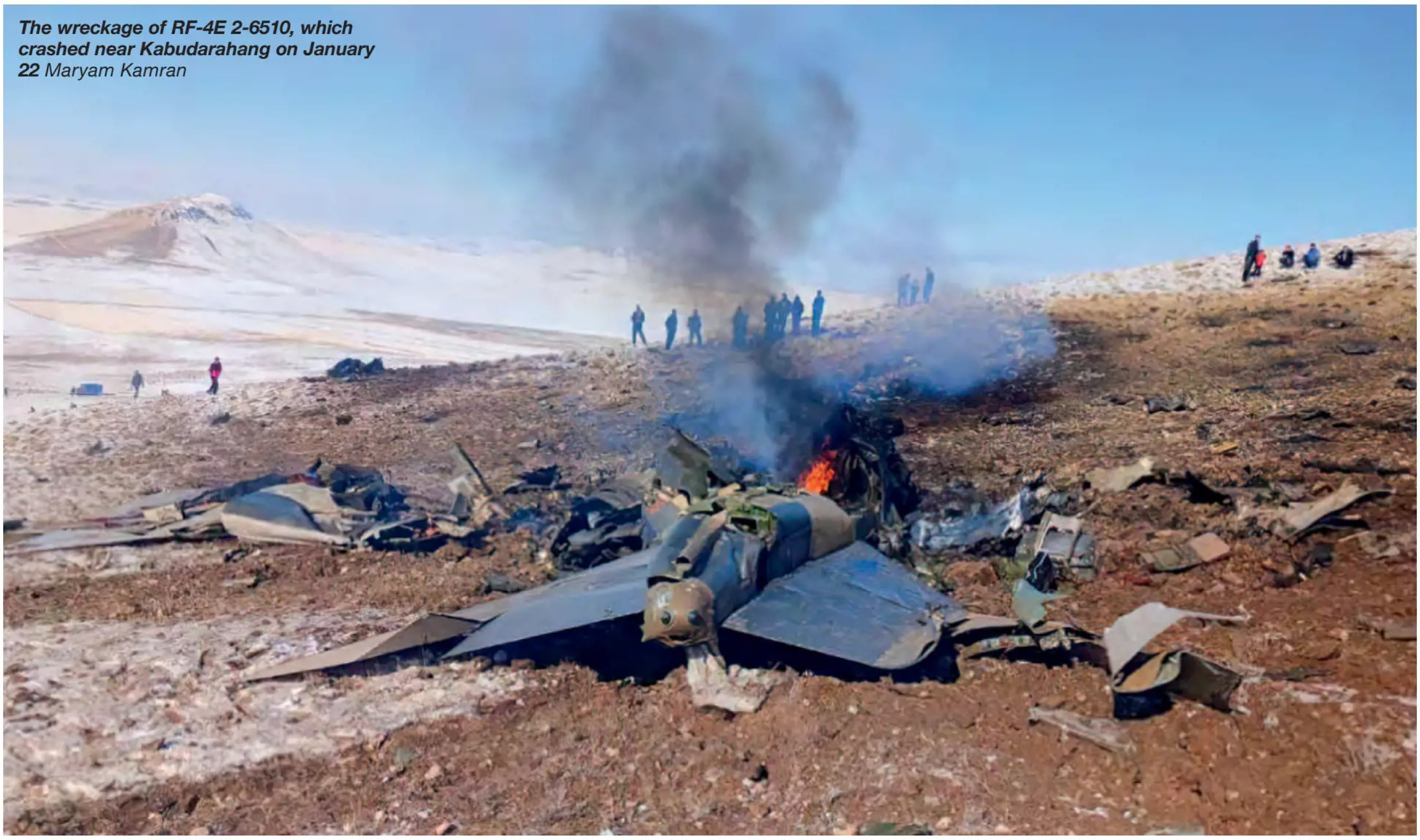
The wreckage of RF-4E 2-6510, which crashed near Kabudarahang on January 22 *Maryam Kamran*

Revolution in 1979, the IIAF lost two more RF-4Es. One of them (2-6505) crashed due to pilot error during a training mission on June 20, 1977. The aircraft collided with mountains in the south of Gorgan in the north of Iran while flying at low altitude in bad weather, killing its crew – Captain Abdollah Khajeh-Nouri and 1st Lieutenant Rasoul Kousha. Another RF-4E (2-6501) was severely damaged during landing at the 1st TFB/Mehrabad International Airport after a reconnaissance mission over Iraq in March 1978. The aircraft was decommissioned and withdrawn from use.

In 1977 and 1978, the Iranian Ministry of War's Foreign Procurement office placed two orders for a total of 16 RF-4Es for the IIAF to allow the formation of the 12th TRS at the 1st TFB in 1981. The first order was for five aircraft under the Peace Roll V FMS programme and the second for 11 under Peace Roll IV FMS. While negotiations for their deliveries were ongoing, the US Embassy in Tehran and its staff and personnel were captured by Islamist/Marxist militias on the orders of Iran's dictator, Ruhollah Khomeini, officially ending Peace Roll V and IV. The aircraft from the first programme were transferred to the Israeli Air Force, while the batch of 11 were cut into pieces to serve as spares for the USAF.

The Iran-Iraq War

The 11th TRS, which was the most active squadron of the Iranian Air Force prior to the Islamic Revolution in 1979, had its flight operations reduced in January 1979 and then stopped in February. For several months, the squadron had no flying activity until the Iraqi armed forces began attacking Iranian border posts. Subsequently, the unit resumed its operations in late 1979 and lost one of its RF-4Es (2-6511) in the northwest of Iran on February 24, 1980, killing its crew – Major Mehdi Tayyebi and 1st Lieutenant Abolqasem Kamrani. The exact cause of the aircraft's loss was never determined, but it was rumoured to have been shot down by an Iraqi MiG-23.

On April 25, 1980, two RF-4Es of the 11th TRS were flown from Tehran to photograph the landing site of the US Navy's RH-53D helicopters involved in the failed hostage-rescue Operation Eagle Claw. Then, in the summer of 1980, RF-4E missions were increased as the threat of a full-scale invasion by Iraq was imminent. Finally, on September 22, 1980, the Iraqi Armed Forces officially invaded Iran and occupied several parts of Khuzestan province, including the city of Khorrmashahr. On that day, the 11th TRS had eight of its 12 RF-4Es airworthy, but only seven front-seat pilots were available to fly them, two of whom had not flown for months. Two former RF-4E pilots of the unit who had been fired because of their pro-Shah stance – Lieutenant Colonel Mansour Naseri and Colonel Hasan Bidgoli-Raad – became volunteers and returned to the 11th TRS in the second week of the war.

The RF-4Es, performed reconnaissance missions over Iraq on a daily basis, photographing air bases, major military sites, key economic targets (petrochemical plants and factories), bridges and strategic buildings such as the Iraqi parliament and Saddam Hussein's palaces in Baghdad. These

A group of 11th TRS RF-4E pilots from 1978 *Author's archive*

Above: ***In 1984, Colonel Bahram Ikani was commander of 11th TRS. He was later accused of being a CIA spy over getting an American student visa for his brother in 1988. He was later arrested and executed in 1989*** *Author's archive*

missions were performed for the purpose of battle damage assessment.

The aircraft were mostly flown without any external fuel tanks and most carried modern AN/ALQ-119 ECM pods delivered in 1978. Under the Peace Jammer FMS programme, 73 advanced ECM pods had been purchased, but only 15 of them had been delivered, entering service with the 11th TRS when the deal was cancelled by Iranian Prime Minister Shapour Bakhtiar on February 5, 1979,

During the Iran-Iraq War, the IRIAF's RF-4Es performed hundreds of tactical reconnaissance missions deep inside Iraqi airspace. Strategic bridges were subsequently attacked by the F-4D/Es using GBU-10 Paveway III laser-guided bombs. During one of these missions on May 7, 1982, an RF-4E piloted by Major Bahram Ikani, commander of the 11th TRS, photographed a floating bridge of the Iraqi Army over Arvand Roud that was later destroyed by the IRIAF, allowing the liberation of Khorramshahr city on May 24, 1982.

During the war, the 11th TRS lost six RF-4Es and ten of their pilots. Two of them crashed during training missions, while four were shot down by a MiG-23MF and Mirage F1EQ. Following the increased attempts by the Iraqis to shoot down the RF-4Es using Roland and Osa short-range surface-to-air missile systems, the RF-4Es started performing high-altitude high-speed missions using their KA-90 cameras. As the Iraqis had managed to down two RF-4Es with air-to-air missiles, these missions were performed with the escort of one or two F-14A Tomcats.

The IRIAF lost three of its four KA-90 cameras in the shooting down of three RF-4Es over Iran and Iraq on August 19, 1982, January 27, 1983, and June 10, 1986. The fourth and last camera was lost in the crash of an RF-4E on final approach to Mehrabad airport in Tehran, on December 29, 1987, putting an end to the high-altitude reconnaissance missions by the 11th TRS. The wreckage of the camera was discovered at the crash site in the east of Mehrabad airport (1st TFB) and was sent to the Department of SSJ and Industrial Research to be rebuilt.

The Iran-Iraq War officially ended on August 20, 1988. By then, the 11th TRS had only five RF-4Es (2-6502, 2-6504, 2-6508, 2-6509, and 2-6510). A few days later, the unit was disbanded and its five aircraft were flown to the 3rd TFB in the west of Iran to form the 31st TRS, using all equipment, aircrews and ground staff of the disbanded squadron.

In 1994 and 1995, the IACI repaired and restored an RF-4E (2-6501) that had been severely damaged in March 1978. This increased the number of aircraft of the 31st TRS to six. However, with the crash of an RF-4E (2-6508) on October 29, 2003, the squadron was once again left with five RF-4Es.

With the loss of 2-6510 on January 22, 2025, the 31st TRS has now been left with only four usable aircraft. These re now the world's last surviving photo Phantoms in military use, following the retirement of the last RF-4C/Es from the air forces of South Korea, Turkey, Greece and Japan in 2014, 2015, 2017 and 2020, respectively. **afm**

Project Dark Gene

The last four RF-4Es of the IRIAF consist of two variants: the early jet with a flat nose and the late version with a larger one. Out of the four remaining, three of them – 2-6501, 2-6502 and 2-6504 – are early variants, the surviving examples of four delivered to the Imperial Iranian Air Force (IIAF) in 1972. The fourth aircraft – 2-6509 – is one of the 12 delivered to the IIAF under the Peace Roll III FMS programme between 1975 and 1977.

The first four RF-4Es, all Block 48s, (2-433 to 2-436) were delivered under the joint IIAF/CIA Project Dark Gene in 1972. The IIAF's 11th TRS at 1st TFB in Tehran operated them, having previously used two USAF RF-4Cs (69-0369 and 69-0370) on loan for the purpose of missions near the Soviet Union's airspace and Iraq in 1970 and 1971. Before this, between 1968 and 1970 the IIAF were adapted with special camera pods on its F-4D Phantom IIs for tactical reconnaissance missions. The four RF-4Es delivered in 1972 were used together with 12 RF-5As, the surviving examples of the 13 that were delivered to the IIAF in 1968. Incapable of aerial refuelling, they had a limited combat range and lacked the capability to carry high-altitude cameras, so they were used for reconnaissance missions near Iranian airspace, while the RF-4Es were dedicated to more strategic missions deep inside the enemy's airspace.

As the USSR's influence in the Middle East increased and the threats from Iraq and South Yemen got louder, the need for RF-4Es for tactical reconnaissance missions under Project Dark Gene also increased. In 1974, an order for the procurement of 12 further RF-4Es (initially serialled 2-437 to 2-448 and later 2-6505 to 2-6516) for the IIAF was placed. They were delivered under the FMS Program Peace Roll III programme August 1976 and March 1977.

The RF-4Es of the second batch, all equipped with a bulged camera bay, were equipped with non-standard equipment, systems and engines at the order of the IIAF. The most important of them were General Electric J79-17C smokeless turbojet engines, which were later installed on the first four RF-4Es. Other non-standard systems included a modern Inertial Navigation System (INS), digital computer, tactical navigation (TACAN) system, signal data converter, interference blanker and an advanced AN/ALR-46 radar warning receiver (RWR)..

Along with the RF-4Es, a range of advanced cameras were delivered to the IIAF, which included Hycon KS-72 oblique cameras for side photography, Fairchild KA-56B low-altitude panoramic camera (from 200-4,999 feet), CAI KS-87B for vertical and side photography, as well as an AAS-15 infrared system and AAD-5 infrared reconnaissance set for night photography. Unlike most RF-4C/Es built by McDonnell Douglas, the examples sold to Iran lacked the AN/UPD-4 synthetic aperture side-looking radar system.

The pictures taken by the RF-4Es of the 11th TRS were not only used by the Imperial Iranian Army's Intelligence and Reconnaissance Command but by the US CIA as part of Project Dark Gene. In 1973 and 1974, some of the IIAF's RF-4Es were occasionally flown by USAF crews during their missions over Yemen, Iraq and even the USSR. During one of these missions on November 28, 1973, an RF-4E (2-435) was shot down by a Soviet Air Force MiG-21SM piloted by Captain Gennadii N Eliseev, a Deputy Squadron Commander of the 982nd Fighter Aviation Regiment based at Vaziani, Georgia. He initially attempted to shoot it down using K-13 heat-seeking short-range air-to-air missiles and then a 23mm cannon, but , having failed, rammed his aircraft into the RF-4E, losing his life. The US crew of the RF-4E ejected and were captured, but released after several days.

Red Dragon roars into life

Mina Adel assesses the effectiveness of PLAAF's sixth-generation fighter fleet unveiled at the start of the year

2025 is a special year for the Chinese, not only because it is the Year of the Wood Snake, which is associated with wisdom and intuition, but also because the People's Liberation Army Air Force (PLAAF) unveiled two 6th-gen fighter jets to the public. This event, captured in photographs, shocked the world. Experts described it as a strong signal of the level of technology and rapid development of the PLAAF, and a threat to NATO's air superiority. However, others dismiss this concern, emphasising the continued dominance of Western air forces in future aerial conflicts.

Due to the lack of clarity regarding the true capabilities of these aircraft, *AirForces Monthly* reached out to Lt. Col. Daren Sorenson (Ret.), an American Weapons School and Red Flag Instructor Pilot, and Daniel Robinson, an ex-Royal Air Force F-22 exchange fighter pilot. Robinson is now the CEO of Red6, a unique company that has redefined the future of advanced training.

Beyond expectations

Gen. James B. Hecker, the senior US Air Force commander in Europe, said: "Russia's invasion of Ukraine has proven that air superiority is vital to success in conflict."

From this point of view, the USAF is working with its Asian allies to form an effective and flexible force capable of securing the airspace and supporting various combat operations on the battlefield. However, given the long distances, this effort relies on High Value Assets (HVA) such as ground and air early warning networks and refuelling aircraft.

Recently, many effective plans have adopted new strategies based on long-range weapons such as the AIM-174 beyond-visual-range air-to-air missile (BVRAAM) and the under-evaluation AGM-183 Air-Launched Rapid Response Weapon (ARRW) and Stand-in Attack Weapon (SiAW) missiles. These weapons can neutralise the opponent's High Value Assets (HVA), thwarting attacks, and tackling PLAAF operations. However, Chinese adaptation is evident in the design of these new 6th-gen fighters, which highlight many new characteristics.

Robinson explained: "The sleek, aerodynamic, and tailless flight control

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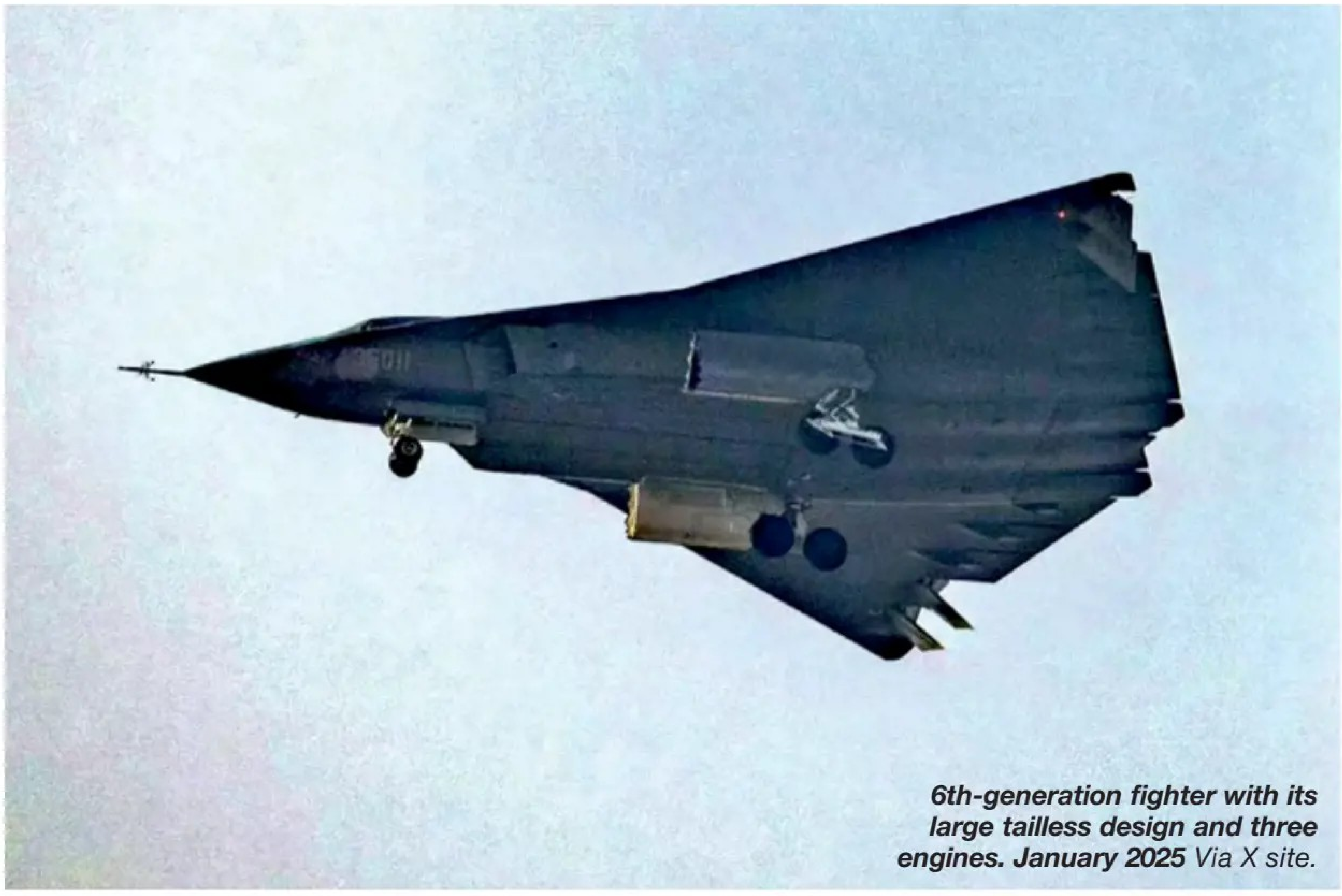
The 65th Aggressor Squadron F-35s fly in a two-ship formation from Nellis Air Force Base, Nevada, June 9, 2022. *USAF/Tech. Sgt. Alexandre Montes*

designs all appear to optimise for that stealth, speed, and manoeuvrability of a 6th-gen fighter. I would expect to see service ceilings and operating speeds continue to increase with internally carried weapons and advanced sensor capabilities." He added, "Interesting they're flying such an advanced platform so early out in the open. Clearly, it's to make a powerful statement."

From his vast experience, Sorenson warned: "My initial thoughts revolve around its capabilities as a high-speed, supersonic strike aircraft or interceptor. Supersonic aircraft, tied with low observable characteristics (LO) and potentially long range, would pose a significant challenge to Defensive Counter Air assets and air defence systems."



6th-generation fighter with its large tailless design and three engines. January 2025 *Via X site.*

PLAAF's J-16 4th-generation heavy multi-role fighter during a display in Zhuhai Air Show 2024,
Taehun Kwon, aero_typhoon

USAF F-22 5th-generation Air superiority fighter during a display in South Korea
Taehun Kwon, aero_typhoon

The new generation of fighters has its own philosophy. They may not have the same manoeuvrability capabilities as 5th-gen aircraft like the F-22 Raptor or advanced 4th-gen aircraft such as the Su-35. The reason is simple: they are not designed to face opponents at close or even medium range. Instead, they are intended to be like a maestro, capable of managing missions from a distance via unmanned combat aerial vehicles (UCAV) or Collaborative Combat Aircraft (CCA), which is like NATO's 6th-generation concept. However, having such advanced combat units also poses many concerns.

Robinson stated: "From my time flying in the Raptor, I learned that the design is a true technical feat, but our real advantage remains in the ability to maintain and sustain them. Sustainability and logistics, more than development, are some of the most important aspects of a 5th (or 6th) gen weapons system. It will be interesting to see how their maintenance matures in that aspect of stealth aircraft operations."

Sorenson added: "They may want us chasing this ghost, so we're distracted and don't focus our resources on discovering their true intent. That's why our intelligence agencies play such a critical role. Decision makers will obviously be briefed on both open source and classified intel going forward. That's why we can't really jump to any conclusions based solely on one event that was held for everyone to see."

The PLAAF understands NATO well.

PLAAF's new fighters also raise many doubts about the effectiveness of the current PLAAF 5th-gen fleet if it cannot meet the necessary standards, especially in long-range offensive operations. This concern was a driving force behind the development of more advanced fighter planes. Bearing in mind the statement of Gen. Kenneth S. Wilsbach, the Pacific Air Forces (PACAF) commander, at the Air & Space Force Association in September 2022: "Some recent close engagements we had with our 5th-gen jets and some of their J-20s" in the Pacific region, the Air Force had "learned a lot from that," but that "it is nothing frankly that I would worry too much about."

Sorenson stated: "Our 5th-gen is the fighter pilot cheat code of its generation so many may try to compare the tactical abilities of jet to jet and say 5th-gen could still win a 1 on 1 engagement vs the PLAAF 6th-gen, and that may be true. However, if you raise the comparison from the tactical level to the operational level, the challenge of defending an entire area of responsibility (AOR) becomes much more complicated and challenging."

Robinson added: "I'd like to see the US and NATO accelerate our programs for future systems. The Raptor changed the rules of the game, and that same commitment is needed to resolve the current delays for the next generation of air dominance. Our own 6th-gen must capitalise on the lessons we've learned from 4th and 5th- gen and of course, take advantage of new and innovative training technologies."

According to the latest Pentagon paper, both the PLAAF and People's Liberation Army Navy (PLAN) now have more than 2,400 combat aircraft, with around 1,300 being 4th-gen fighters, which make up the majority of their fleet.

In recent years, efforts have been underway to increase the number of latest-generation fighters for various missions, such as air superiority. Examples include the J-16 and its naval counterpart, the J-15, both of which can launch long-range air-to-air missiles like the PL-17. This capability poses a significant

threat to the high-value assets (HVA) of the United States and its allies, such as logistical or electronic support aircraft. Additionally, some Chinese aircraft of these two models have recently been produced to specialise in electronic warfare, similar to the US Navy's E/A-18 Growler. These combat units are tasked with escorting long-range strategic PLAAF bombers.

Additionally, the J-10C multi-role aircraft production is being expanded. Despite their short range and medium ability to carry ammunition, which limits their participation in combat missions far from their bases, they will be suitable for reducing the pressure of combat missions on the J-16 aircraft. This will provide the J-16s with sufficient flexibility to operate in remote missions with ease.

Finally, continuous work is being done on the expansion and development of the J-20 aircraft fleet, which has exceeded 200 aircraft according to many sources. Additionally, efforts are being accelerated to support the PLAN with J-31 aircraft to operate aboard aircraft carriers, enhancing the efficiency and effectiveness of combat formations to a level equivalent to F-35 aircraft.

Evaluating the above, it is clear that the Chinese vision of their air capability combines the eastern advantages of rapidly acquiring a large number of easy-to-manufacture and less expensive fighters, while supporting them with fewer units of more advanced generations built on the basis of Western concepts. This vision differs greatly from Russian aviation and its methods of work, and perhaps the reason is due to two main factors. The first is the interaction of the PLAAF and PLAN with Western jets in annual air exercises, such as the Falcon Strike with the Royal Thai Air Force and Gripen fighter jets, which can be considered a laboratory for tactics and the effectiveness of weapons systems. Recently, the Falcon Shield exercises with the UAE Air Force and Mirage 2000-9 attack aircraft have also contributed. The second factor is the intelligence aspect, including contracting with former Western pilots to train Chinese pilots on fighters and benefit from their expertise.

Train Like You Fight

Through the 6th and 5th generations, the Chinese are trying to reach a balanced equation between number and quality to strengthen their offensive capabilities. The USAF adapted by raising the standards of training. This is evident in the reactivation of the 65th Squadron in 2022, making it the first aggressor squadron in the world to operate 5th-generation aircraft, notably the F-35. This

PLAAF's J-20 5th-generation Air superiority fighter during a display in Zhuhai Air Show 2024
Taehun Kwon, aero_typhoon

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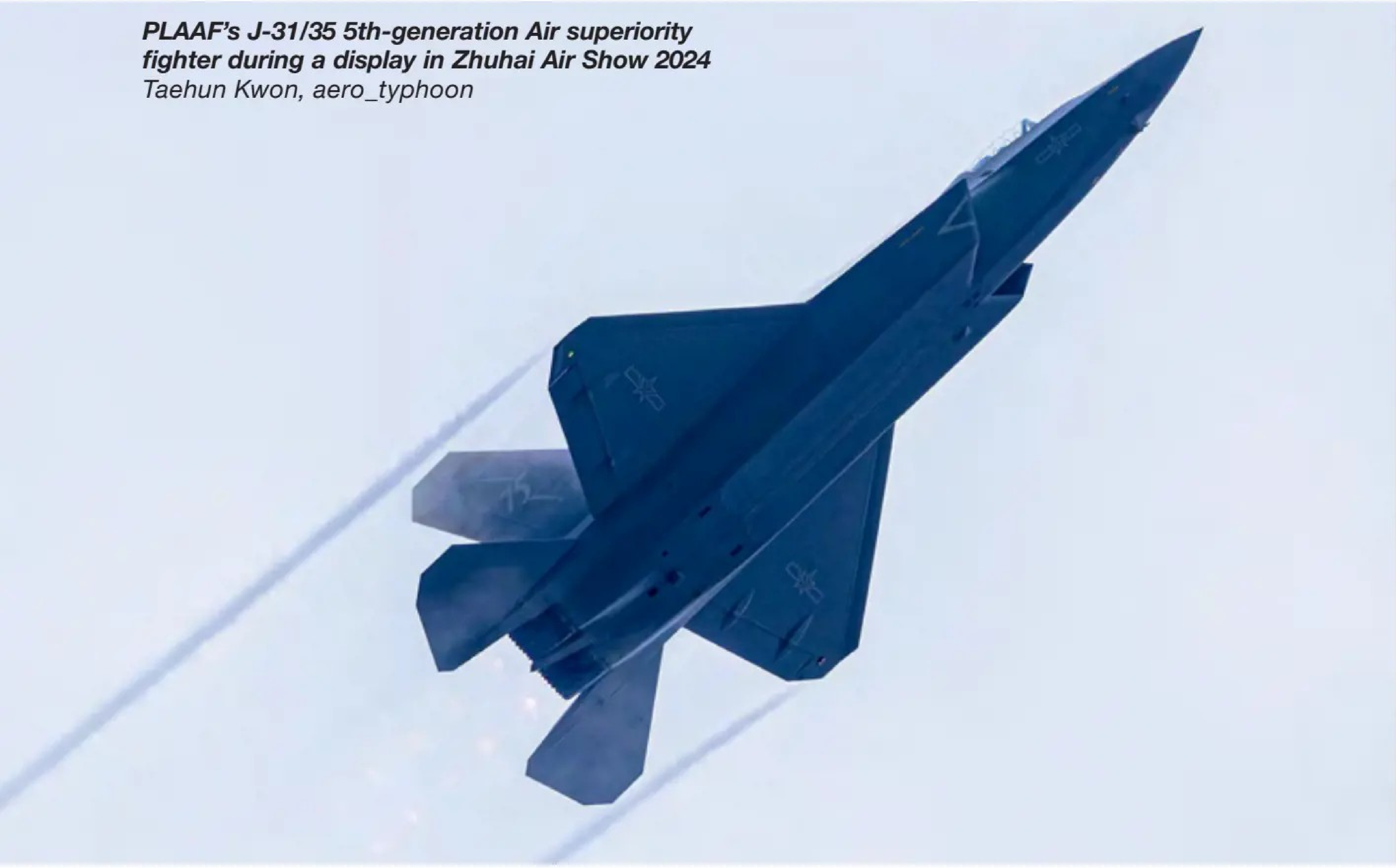
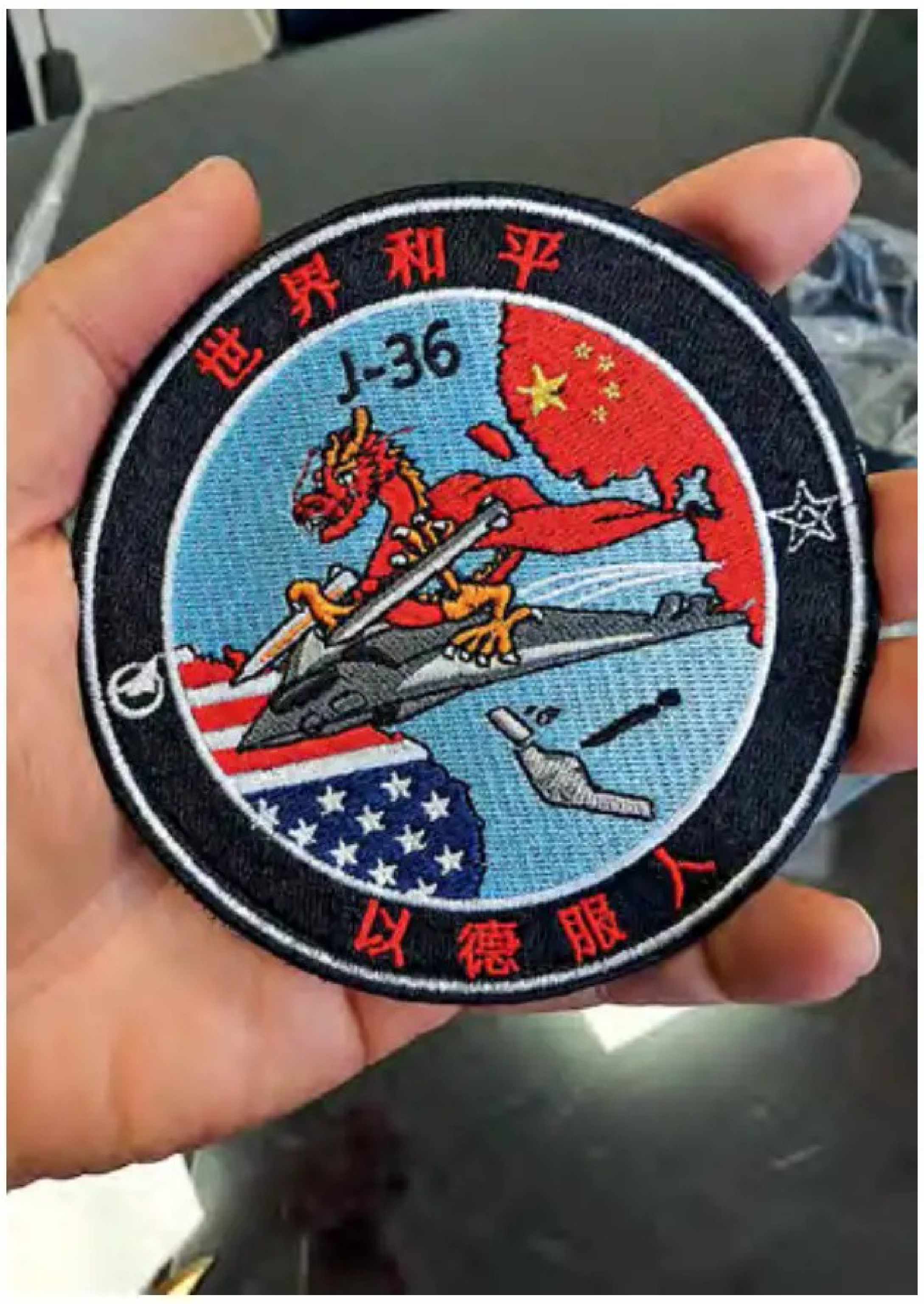


PLAAF's J-31/35 5th-generation Air superiority fighter during a display in Zhuhai Air Show 2024
Taehun Kwon, aero_typhoon



Above: ***An interesting patch resembles the nature of the J-36, the CAC 6th-generation jet with a red dragon holding long range Air/Air missile and long range YJ-21 hypersonic missile while shooting down USAF B-21 stealth bomber.*** *Via X*

squadron has become a major part of the red team within the Red Flag exercises; their mission is to test the capabilities of the blue team, represented by USAF squadrons and their allies. In addition to utilising specialised aggressor companies that own combat aircraft developed to simulate future air threats, the most important of these companies are Top Aces and their modified F-16 aircraft. These aircraft participate in many air exercises, such as Northern Lightning and the USAF Weapons School Integration Training (WSINT).

But how will PLAAF's 6th-generation aircraft affect the training process in the future, especially in the Pacific region, where there is a large theater of operations that requires surveillance and defense against low observable "stealth" hostile aircraft that can fly long range and at high speed to carry out covert reconnaissance or offensive operations against high-value targets?

Sorenson added: "Even Red Flag is a bit airspace constrained to run realistic exercises against a 6th-gen supersonic deep strike or HVAA attack scenario. Probably need to go out over the Pacific to get the full setup ranges you want to replicate the operational and tactic problems."

USAF already conducts many air exercises in the Pacific, like Pitch Black in Australia, but these exercises are very expensive and are

Above: ***PLAAF's J-15D 4th generation heavy electronic attack jet during a display in Zhuhai Air Show 2024*** *Taehun Kwon, aero_typhoon*

held every two years. Therefore, it requires innovative and less expensive solutions to train the new generation of pilots periodically.

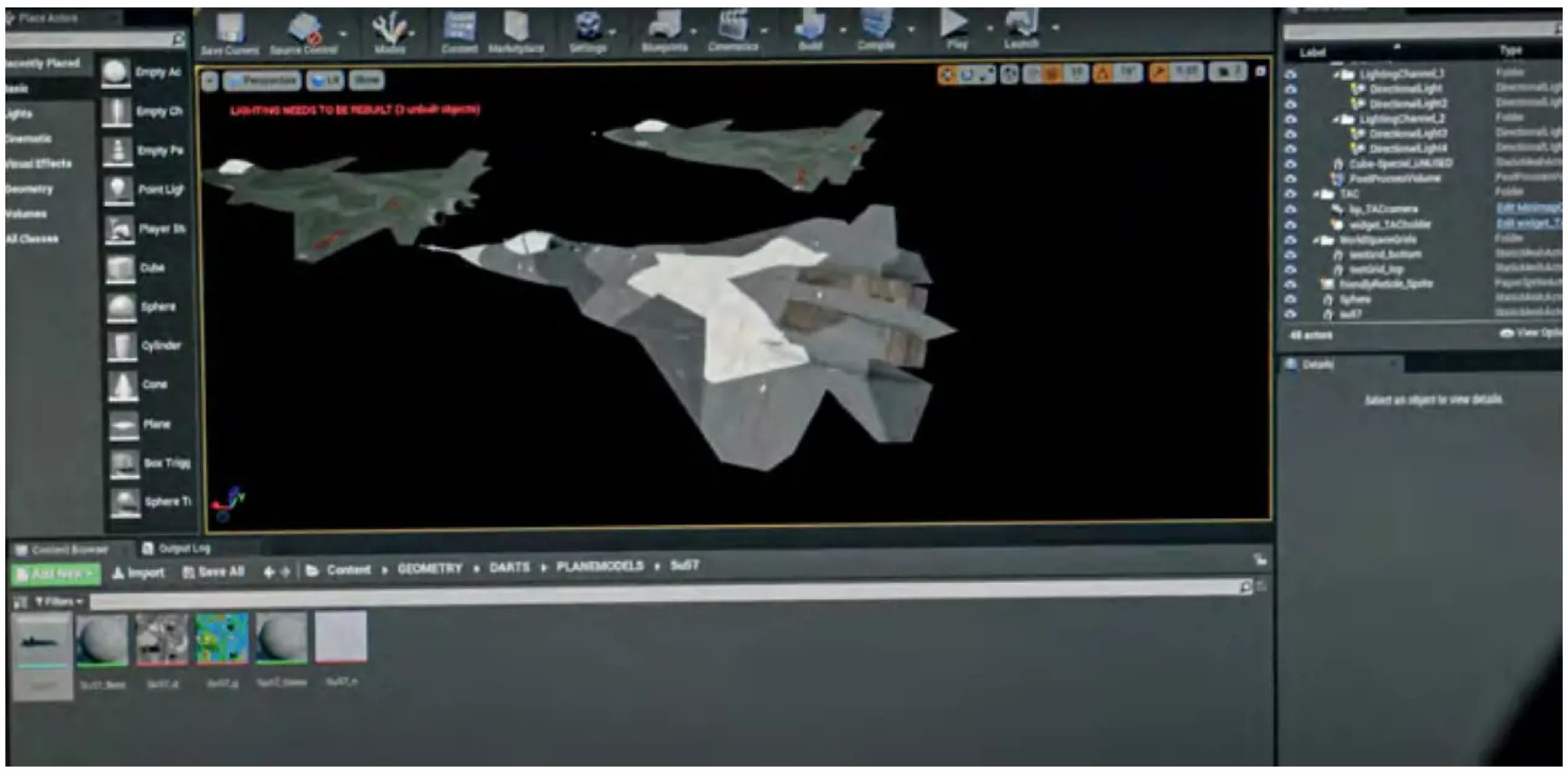
Robinson explained: "With PLAAF fighter designs already in the testing phase towards an operational capability, I'm convinced more than ever that we can only be as good as that to which we train. Like the saying goes, train like you intend to fight. Red 6 Advanced Tactical Augmented Reality System (ATARS) program brings an augmented reality system that enables training to adversary capabilities in realistic tailored scenarios and enhancing operations. Having the infrastructure to adequately train to the 6th-gen combat environment? ATARS enabled that capability and capacity."

ATARS is a multi-node, all-domain augmented reality (AR) system that enables a complete LVC ecosystem for multiple users, from beyond visual range (BVR) to within visual range (WVR) in dynamic environments. The technology concept visualises the aggressor aircraft onto a pilot's helmet visor, helping them train on air combat scenarios. In 2024, the system was tested by Boeing in their new advanced trainer T-7 and by Lockheed Martin/Korea Aerospace Industries (KAI) on the T-50 platform. Additionally, in January 2025, ATARS was tested by the Royal Air Force (RAF) on the BAE Systems Hawk T2.

Undoubtedly, the 6th-gen PLAAF aircraft gives us a new glimpse into the future of air warfare, which will be more complex. In parallel with the emergence of these new generations of fighters, manufacturers and users of older generation aircraft will be forced to further study and develop advanced software and hardware. Until now, older generation aircraft with their future versions will continue to represent the bulk of air formations. Therefore, they must possess innovative and unconventional solutions, not only operationally but also at the training level to compete with these advanced threats.

Sorenson concluded: "I think it's the responsibility of our respective Department of Defense organisations to be able to defend our countries against not only Most Likely Enemy capabilities (or Courses of Action) but Most Dangerous COAs as well. From that perspective, you must take the threat of such a platform seriously. Hopefully, our intelligence services would give us more classified insight into the maturity of its capabilities."

Robinson added: "The PLAAF reveal of China's latest 6th-gen platforms is a good reminder that we must focus on giving our warfighters the latest technology and innovations to maintain the air dominance edge. It appears China, like the US and Allies, has focused on capabilities for both piloted and autonomous systems. How they operate together will really define the future of air combat." **afm**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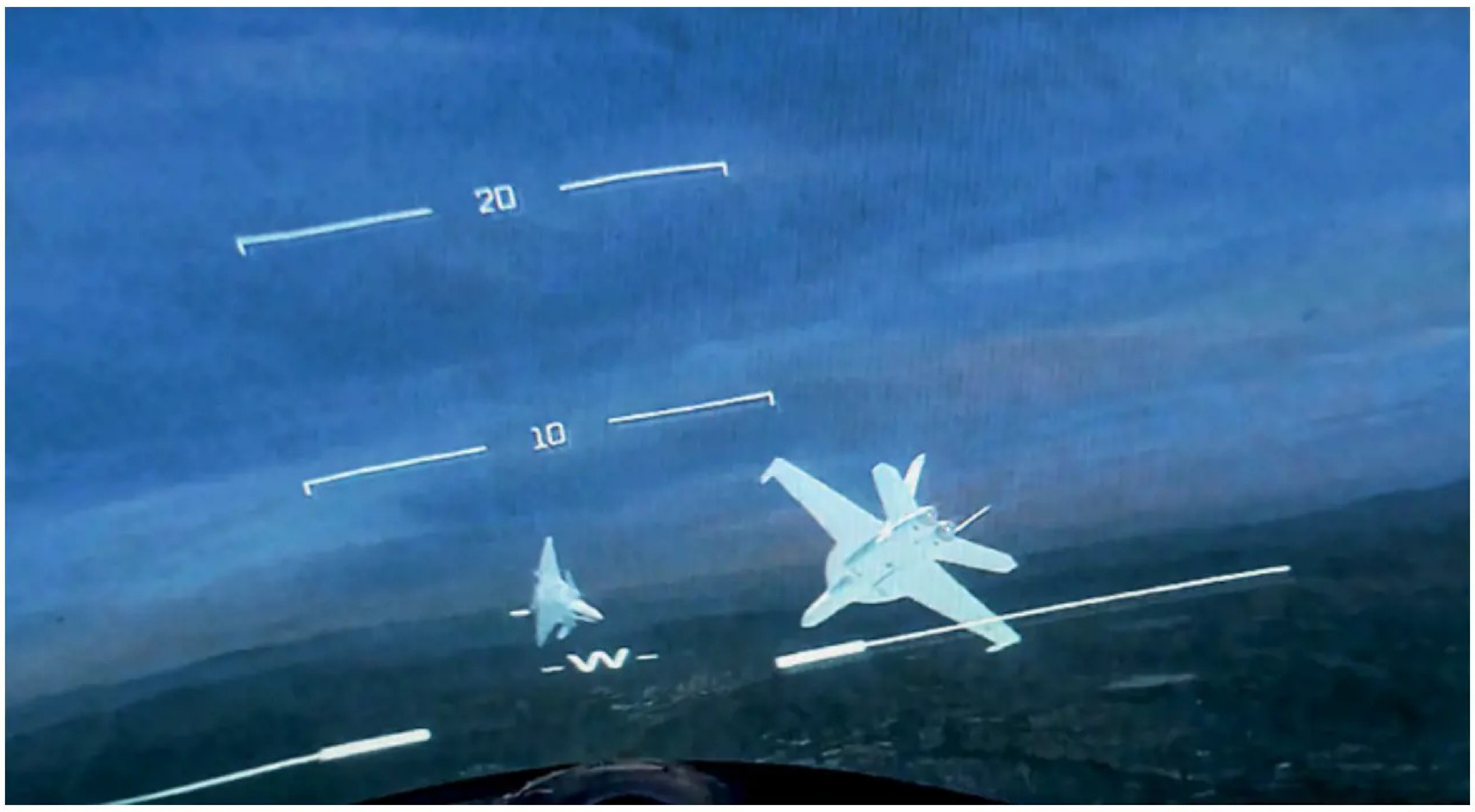
Right: ***Red 6 innovative advanced training program ATARS during adversary's simulation.*** *Red6*



Below right: ***Exclusive photo from Red6 showing a simulation of an intense dogfight between US Navy F/A-18 Vs PLAAF's J-20.*** *Red6*

French forces fly over the vast region south of the Sahara that seems to go on forever
All images Al J Venter collection

AFRICA HEADS for anarchy

The warning is stark: Islamic State and Al-Qaeda militants have made such dramatic insurgency gains in Africa in the past three years that North Africa has transmogrified into a cauldron of destruction. **Al J. Venter** reports

Insiders in Paris's Elysees Palace already refer to conflict in West Africa as 'our 400-year war", while the *New York Times* went a step further, cynically referring to the troubles as "Europe's Forever War".

Indeed, one authority states, Islamist extremism and the expanding influence of Russia and China are driving significant challenges to NATO's southern flank and the West is now faced with a series of continent-wide African insurgencies.

He claims that if these influences are not checked, NATO – with the United States at the helm – could be forced to take action, sooner rather than later.

Unquestionably, more conflict is almost certain to follow – even without taking into account simmering ongoing hostilities in Nigeria, vast swathes of an ungovernable Democratic Republic of the Congo, Libya, almost perpetual hostilities in South Sudan, the Cameroon's northwest and southwest regions and a fast-escalating insurgent war in northern Mozambique (which threatens to destabilise the southern half of the African continent).

France withdraws

The reasoning behind these dynamics is fundamental. Within the past two years, France has been forced to vacate all its ground and air military assets from seven of its former African colonies: Mali, the Niger Republic and Burkina Faso, the Central African Republic and, late in 2024, President Emmanuel Macron was given notice in Senegal and Chad – with the French simultaneously vacating its Chadian Faya military base in the Sahara desert – all declaring that its troops and aircraft are no

Chad Air Force Sukhoi Su-25 at N'djamena Airport. With the French gone, nobody is certain who will service the few jets that are still operational in the future

longer welcome. The Ivory Coast followed late last December.

What that means is the Western half of Africa is now left with minimal air cover. In Mali alone, Paris originally deployed scores of helicopters – both gunships as well as transports – for the decade that they were countering jihadist insurgency, from January 2013. These have all been pulled back to the Metropolis.

Similarly, though on a lesser scale, French aircraft are no longer permanently based in any of the countries from which they were ousted, including those helicopters and jet fighters based at N'Djamena in the Republic of Chad, for decades France's largest foreign air force base.

Additionally, a vast range of allied helicopters are gone: Royal Air Force and Canadian Chinooks, German NH-90s – as well as Tiger Eurocopter attack gunships – Canadian CH-146 Griffon utility tactical-transport helicopters, Spanish NH-90s (intended for training Malian pilots), scores of Russian and Ukrainian M-24s, Mi-8s and 17s and a variety of other rotor wings.

Equally vital were the freighters: C-130s from a dozen nations, mostly European: French Transall C-160s and more, including a Portuguese Air Force C-295 medium tactical transporter that operated out of Bamako for a year, engaged in anti-Jihadist operations. The author was embedded for a month with that aviation detachment, reporting for *AFM*.

Arguably, the biggest loss throughout this enormous region has been the *Hinds* and *Hips*, almost all returned to fight in Ukraine. Today, there might be a score left in the whole of West Africa and, because groundcrews too have departed, most are barely fit for duty.

The criticality of these events is serious, to the extent that the Ukraine conflict recently caused the Benin Air Force to acquire Russian helicopters to be abandoned. The production lines of the state firm Russian Helicopters has been so disrupted that it has been unable to provide three Mi-171s – ordered and paid for – to strengthen its fight against armed groups in Benin north.

Threat to Europe

That all these events have a direct effect on the security of Europe is manifest. Yet, the undercurrents affecting the long-term security of southern Europe (and causing the largest migration of dissidents since the end of World War Two) have received little international attention.

Nor is it acknowledged that most former European colonies in the region – Ghana included – are now engaged in a series of ongoing insurgencies involving both Islamic State and a totally revitalised Al-Qaeda military command, and doing so on a scale never before achieved in the African domain.

Similarly, few are aware that the area vacated by the French in Africa extends across roughly five million square kilometres, an area more than half of the size of Europe, within the conventional borders assigned to it.

More pertinent, all seven former French colonies – taken together – now comprise the largest single region inexorably sliding towards anarchistic chaos, the worst political collapse experienced anywhere globally for decades. These issues are almost totally disregarded, not only by the majority of political pundits but also by most European and American media outlets.

Washington too, has come under fire. Having been forced to vacate one of the most advanced aerial observation facilities on the planet last year – United States Air Base (AB) 201 located on the outskirts of Agadez (a remote city in the extreme north of the Niger Republic) – just about all major surveillance operations across huge regions of West Africa's Sahel have been halted.

French Air Force C-160D Transall landing on a primitive strip in the Sahel interior in the early days of the conflict

French Air Force Cougar helicopters played a pivotal role in the Mali counterinsurgency war while Paris still strode tall in that arid region

American MQ-9 Reaper drones that operated from there effectively kept jihadist forces in check throughout vast swathes of West Africa, but most of that is now history. The Pentagon is now in the process of patching together a back-up counterinsurgency plan in several neighbouring countries that might include Ghana.

Islamic resurgence

The consequences of all these developments, if not dealt with promptly, will cause an Islamic resurgence that could take generations to reverse.

One example will suffice: titled, *NATO's Southern Front – Malign Influence and Extremism in North Africa*, written by Doug Livermore. Livermore is the national vice-president for the Special Operations Association of America, senior vice-president for Solution Engineering at the CenCore Group and a Special Forces veteran. He declared in October 2024 that North Africa has become a cauldron of tension, with Islamist extremism and the expanding influence of Russia and China driving significant challenges to NATO's southern flank: "Chinese Axisism threatens not just regional security but also poses substantial risks to European nations on the other side of the Mediterranean.

"Russia's aspirations in North Africa have grown more aggressive since the assassination of Wagner Group leader Yevgeny Prigozhin, and the resulting reorganisation has consolidated a wide network of mercenary outfits under the tight control of the Kremlin. Many are engaged in the plunder of the continent's natural resources. Kremlin-linked groups helped smuggle more than $2.5bn in gold out of several West and Central African states in the 18 months following its all-out invasion of Ukraine."

Following the death of Prigozhin in August 2023, a ton-and-a-half of ingot gold was recovered from his home on the outskirts of Moscow. Word has it that there was a roomful of diamonds – also said to be pillaged from Central African mines – that simply disappeared following 'official visits' to the Prigozhin residence by Putin's security personnel.

Resupply operations in the remote northeast of the Central African Republic, twice visited by 'AFM' in recent years

One of the last remaining Mali Air Force helicopter gunships still flying when the author visited the country three years ago

A Wagner aerial observation team active in a Russian 'Hip' in Africa's Sahel

Most salient, Livermore states that the post-Prigozhin leadership structure has reoriented mercenary activities across Africa, pivoting from semi-autonomous operations to a more directly state-aligned, GRU-run force now solely focused on advancing Moscow's strategic interests.

France sits at the forefront of these, because the Macron government is the most severely affected, having lost both the support and the interest of most of its former colonies in Africa.

For this reason, as of early 2025, Paris's new military co-ordination body, modelled on the United States Africa Command, is working to reorganise France's presence on the continent. In addition to preserving military outposts in West and Central Africa, the project entails closer co-operation with a handful of other African states, some of which are English-speaking.

Simply put, a new French air base in West Africa will have to be established, replacing the one that served France for more than half a century in N'Djamena, Chad, and will certainly not be in any of the seven countries that forfeited French links.

Cameroon is one option, another could be one of the countries on the Atlantic coast – possibly Benin or Togo, both now being threatened by a series of insurgent thrusts that are infiltrating at a steady pace from the north.

For all this, the French still have a couple of options left in Africa. There are 1,500 troops, including a Foreign Legion detachment, still active in Djibouti on the Red Sea as a deterrent against possibly hostile actions by Houthi elements in Yemen, as well as a naval unit in an anti-piracy role. Additionally, its Base Aérienne 188 Djibouti accommodates about 15 aircraft as well as a ground-air defence section of eight 10mm twin-tubes and another eight firing stations for Mistral missiles.

There are two squadrons of jet aircraft based permanently in that Red Sea enclave: Escadron de Chasse (Fighter Squadron) 3/11 "Corse" has seven aircraft and the Overseas Transport Squadron with one or more CASA CN-235s as well as three Puma helicopters. Its naval aeronautics unit includes a Breguet Atlantic.

An interesting Indian Ocean outpost that I have tried unsuccessfully to visit several times is Europa Island, a tiny landmass that lies between Madagascar and Mozambique. The base can only be approached by air and plays a nondescript but important security role in the region. Also manned by Legionnaires Europa, the island is shielded from all inquiries about security matters by Paris.

French base

On Africa's West coast, Gabon hosts a modest French force that has been stationed there since independence in 1960, together with an air unit at Libreville's Guy Pidoux AB.

The French defence ministry maintains that its primary mission in Gabon is to train soldiers in the region and boost their capabilities to combat terror, protect land borders and maritime territory; this involves peacekeeping, intelligence and

Mozambique Air Force gunship believed brought down by rebel ground fire during operations in the north of the country. Maputo, following the Russian lead, never comments on combat losses

Russia is believed to be trying to buy back defence equipment it exported; spare parts for 'Hips' and 'Hinds' especially

Russian armour arrives in Bangui, delivery taken by Wagner Group soldiers

Temporary air base in the north of the Mali Republic, with Tuareg defenders always in evidence

logistics. The defence ministry says these roles are in line with the Reinforcement of African Peacekeeping Capacities (Recamp) programme, a training initiative set up in the late 1990s, but whose future is now uncertain because Gabon's current leader, General Brice Nguema, has taken a more xenophobic line than his predecessors.

With the French having been ousted from much of West Africa, these dislocations have brought three other colonies – Cameroon, Togo and Benin – into sharp focus. The Central African Republic doesn't feature because of Bangui's strong ties with Russia; the Wagner force reportedly having an almost free hand in plundering the CAR's resources.

That leaves Togo, further up the coast between Ghana and Nigeria, whose military has recently suffered a number of defeats at the hands of active jihadists who operate mainly in the north, one of the reasons why the army has been overseeing the construction of a new, secret, northern base.

Meanwhile, a contingent of Russian experts arrived in the country to assist the Togolese Army, though this has resulted in friction between the military and President Faure Gnassingbé over how the threat should be countered.

Togo, faced with increasingly frequent attacks by jihadists from the Sahel, wants to speed up acquisition of military equipment for its army. Faure Gnassingbé's government has purchased a number of attack helicopters from Moscow and is also getting help from Washington and London, much to France's chagrin.

Meanwhile, the guerrilla movement Jama'a Nusrat ul-Islam wa al-Muslimin has been making steady gains, taking control of the Togolese army barracks at Dapaong and, last April, shooting down one of the country's newly acquired combat helicopters. With security co-operation with the EU currently on hold, Togo is increasingly dependent on Turkish military experts to help protect its northern borders, also relying on defence firm Paramount Group, and is acquiring militarised drones.

The French Air Force's Tigre helicopter gunships that dominated Mali's skies are now history – almost all have been returned to Europe

Conflict in the DRC

Central Africa, too, is now heavily involved in security issues that affect the Democratic Republic of the Congo's east, as well as Uganda and Rwanda, the two states that lie to its immediate east.

Of serious concern is Kampala's involvement in Sudanese conflict zones – which involve almost daily flights between Entebbe and both the Sudans – and Ugandan President Yoweri Museveni's support of the ultra-radical Rapid Support Forces.

Indirectly, these efforts are shown to have been affecting the security of the formerly French Central African Republic; many of the rebels now threatening CAR capital Bangui originated in the Sudan, with dozens more crossing the border into the region every day.

Also of consequence security-wise is the ongoing jihadist revolution in northern Mozambique, an East African state sitting on some of the largest gas deposits on the planet and from where Putin's private mercenary army was driven out after only four months, three years ago. If anything, that conflict is even more serious in the long term because the entire Southern African subcontinent threatens to be destabilised.

South Africa, Zambia, Zimbabwe and Malawi – all bordering on Mozambique – are indirectly involved, to the extent that SADC, the Southern African Development Community – an inter-governmental organisation headquartered in Gaborone,

UN unmanned aerial vehicles are becoming more widely deployed in Africa's wars, in Somalia especially

Botswana – has hired Rwandan troops in a bid to thwart the jihadist presence. Millions of dollars have been spent, but very little achieved apart from endless discussions. Word on the ground suggests that Rwanda talks a good deal about its role in that war, but in reality achieves almost nothing.

The prime reason for any lack of success in Mozambique's war is a chronic shortage of air power to counter jihadist advances.

On paper, the Mozambique Air Force lists 4,000 personnel and few pilots with military experience and is stuck with perhaps a dozen fully operational aircraft that include antiquated MiG-21s and some *Hinds* and *Hips*, several of which have been knocked out by rebel ground fire.

Russia has consistently promised gunships but is constrained by its own needs in Ukraine, while South Africa, the best equipped air force on the continent until the African National Congress took over, can now only field a handful of combat aeroplanes and helicopters.

US Reaper drones were a regular feature over the Niger Republic, but notice was given by the ruling junta last year that they wanted the Americans out. The air drone facility at Agadez in the north of the country is no longer operational

Islamic State

A recent assessment of that conflict comes from a study published with support from the Institute for the Study of War and titled, *Islamic State Resurgent in Mozambique; al-Shabaab's Ramadan Offensive*, a welcome addition from an African region where the media and free speech is all but banned.

Essentially, the study centres on the potential of an Islamic-led revolution – with few military resources of its own – successfully spearheading into the rest of the sub-continent, not impossibly because there are millions of Africans who embrace the tenets of Islam. South Africa boasts two or three million Muslims, the majority non-militant and peace-loving.

But recent events in South Africa have also suggested a powerfully military Islamic corps, many among the Asian population in KwaZulu/Natal on the Indian Ocean and still more within some communities in both Cape Town and the unpronounceable Gqeberha (formerly Port Elizabeth).

Possibly things will change with President Donald Trump, but sadly, even by his own admission, Mozambique features well down on his list of priorities. As things stand, Africa's military lingers at the bottom end of the spectrum and if changes are made, it will take time to have them implemented.

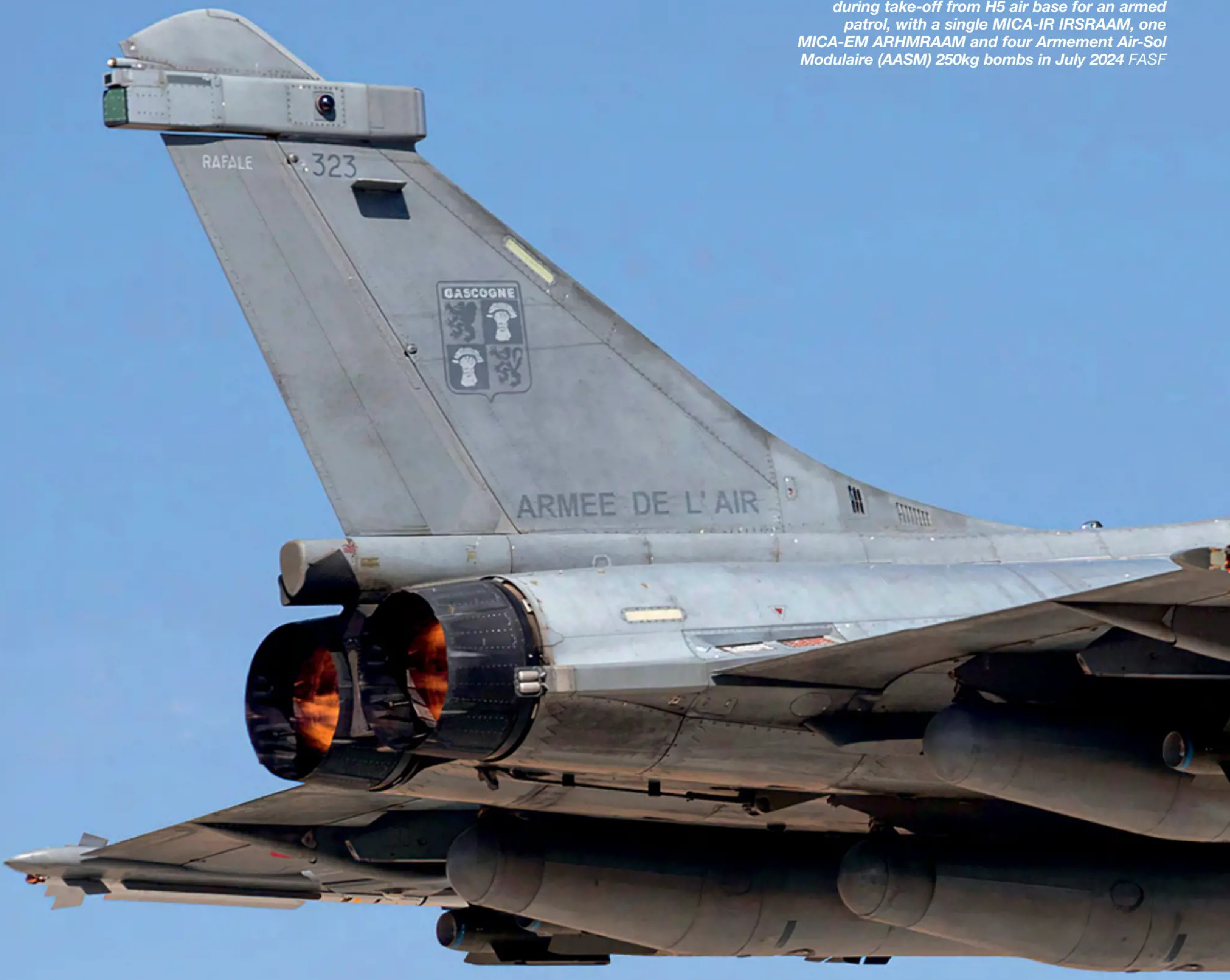
In testimony before the Senate Armed Services Committee two years ago, the Pentagon's Stephen Townsend echoed a line favoured by his predecessors that AFRICOM maintains a "light and relatively low-cost footprint" on the continent. This "light" footprint consists of a constellation of more than two dozen outposts that stretch from one side of Africa to the other.

To this end, there were until recently, roughly 2,000 American Special Forces troops deployed throughout the continent, operating on what were referred to as 30 "Enduring" and "Non-Enduring bases" but that with President Biden went sharply into decline.

Permanent bases (with ground as well as air capability) included two each in Djibouti, Kenya and the Niger Republic as well as military establishments in Senegal, Uganda, Gabon, Chad and Burkina Faso. Most of these now exist only in theory.

Yet, there is an element of hope in West Africa: the permanent US base at Kotoka International Airport in Ghana is quoted by one reliable source as being at the heart of the US military's West Africa Logistics Network. There are weekly flights from Ramstein AB in Germany that ferry into Accra supplies (including arms and ammunition) for American units spread out across West Africa.

Unfortunately, this situation is tenuous. While these supply flights actually take place and Ghana has consistently shown a preference for Western security values, there are few in Accra who are prepared to publicly acknowledge these links. **afm**



A Rafale B of the 4th Fighter Wing (323/4-HT) during take-off from H5 air base for an armed patrol, with a single MICA-IR IRSRAAM, one MICA-EM ARHMRAAM and four Armement Air-Sol Modulaire (AASM) 250kg bombs in July 2024 FASF

French jihadi hunt

ters

Babak Taghvaee details the role of Rafale B/C fighters in the new phase of France's Opération Chammal against ISIS in the Middle East

As a result of a military offensive by various Islamist militia groups, backed by the government of Turkey, Bashar Al-Assad's regime fell in Syria on December 8, 2024. A security vacuum and chaos were created as a result, taken advantage of by Islamic State (ISIS) terrorist groups, allowing them to retake control of several remote regions of Syria and establish camps and a training centre. In response to the return of ISIS to the Syrian deserts, the air forces of France and the United States have increased their operations in Syria. After three years of pause, the French Air and Space Force (FASF) used its Rafale C multi-role fighter jets and MQ-9A Reaper armed drones in Opération Chammal to target ISIS.

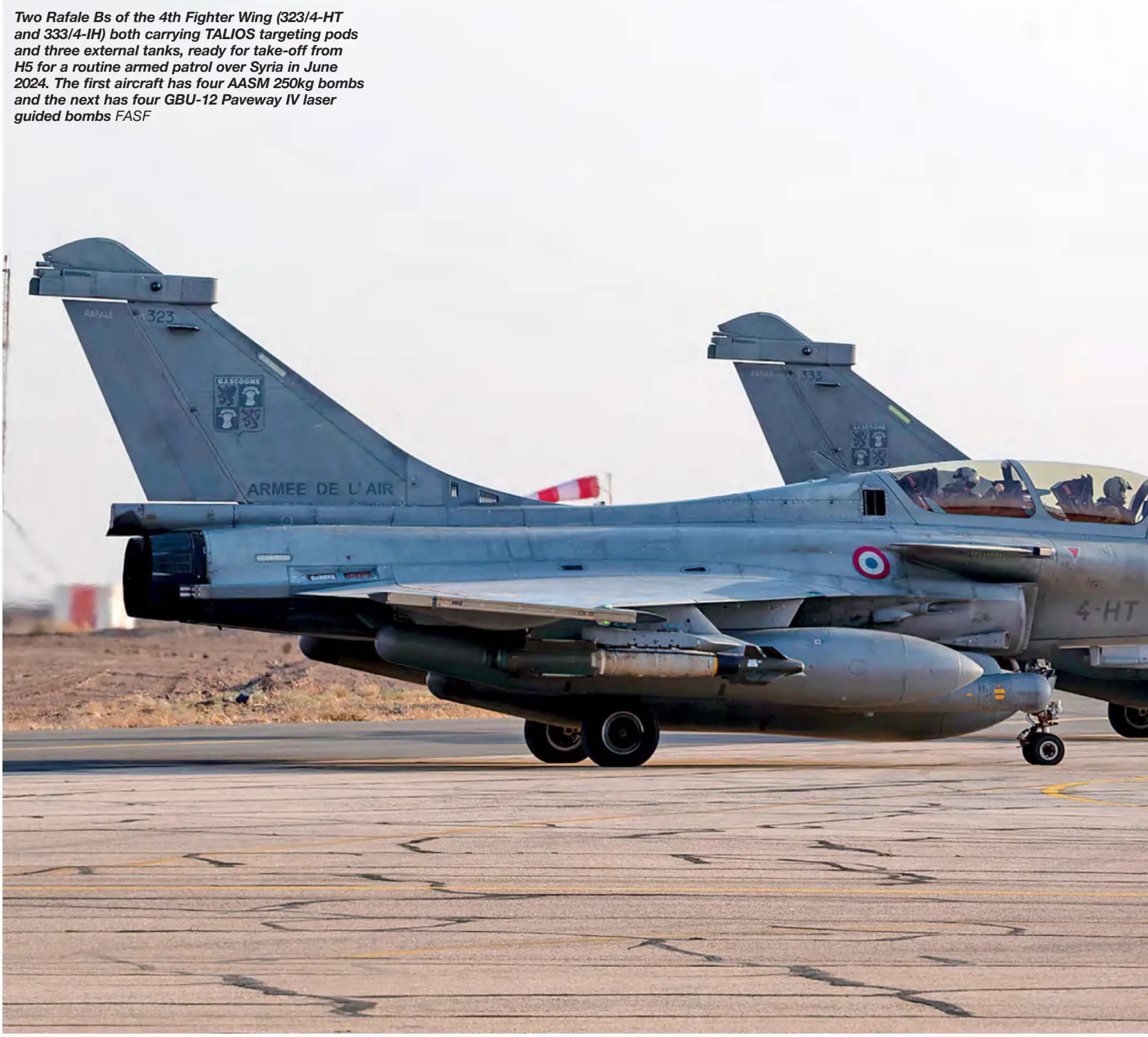
Stabilisation phase

Since September 19, 2014, the FASF has been a key participant in the French Armed Forces' anti-ISIS Opération Chammal. On that day, two of the FASF's Rafale Cs assigned to Fighter Squadron 1/7 (EC 1/7) 'Provence' dropped four GBU-12 Paveway II laser-guided bombs at a weapons depot of the terrorists in Mosul, killing 75 of them on the spot.

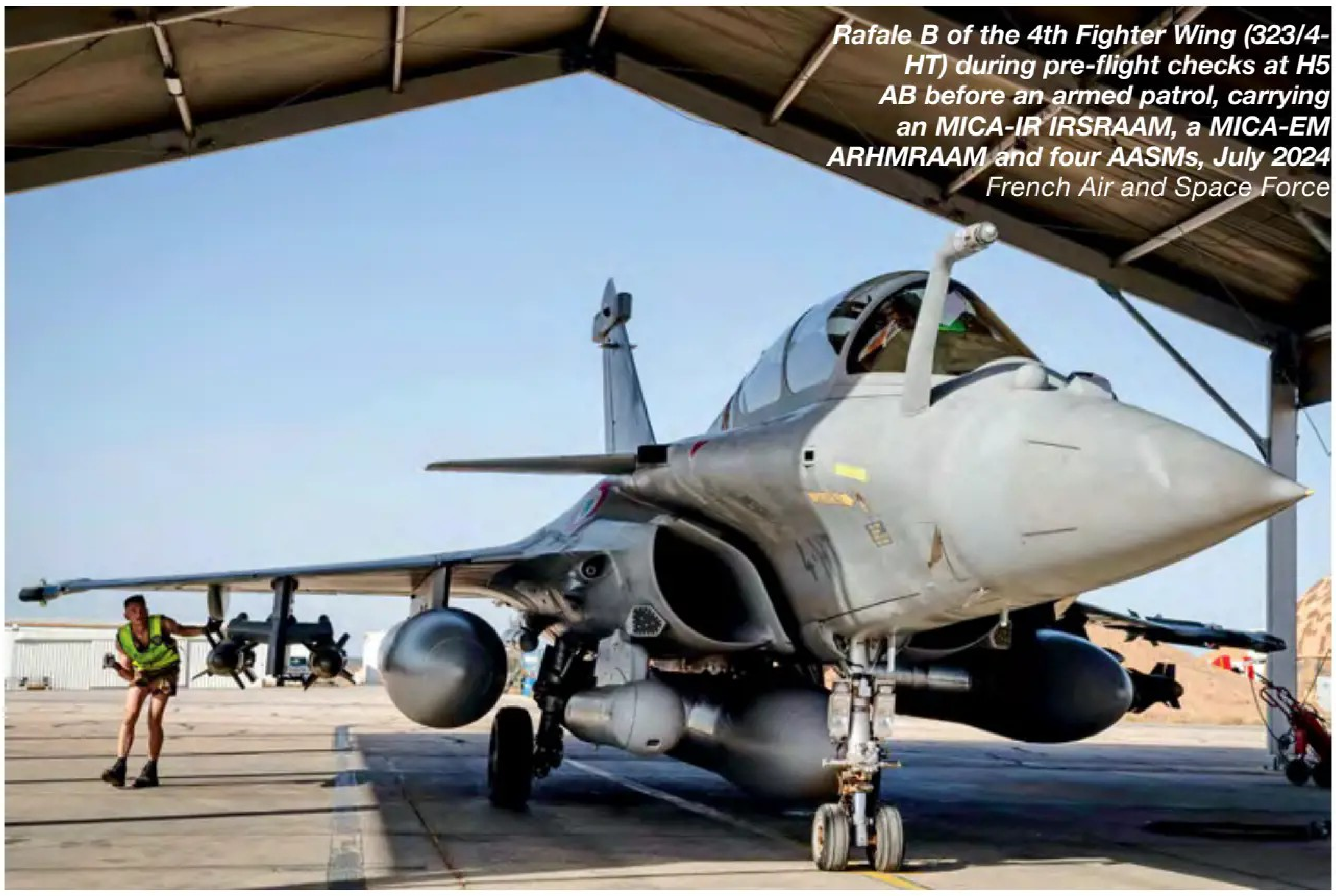
During the initial months of the operation, FASF Rafale B/Cs plus C-135FR and KC-135RG tankers, as well as USAF KC-135R/Ts and KC-10As, conducted missions from Al Dhafra Air Base in the UAE. Eventually, six Mirage 2000Ds from Fighter Wing 3 (EC 30) were deployed to H5/Al-Azraq Air Base in Jordan for the first time to conduct airstrikes.

The Mirage 2000Ds were later replaced by Mirage 2000Ns and then Rafale B/Cs in Jordan. Starting in late September 2015, they carried out airstrikes against Daesh in Syria, too. Over five years, the FASF's fighter jets deployed in Jordan played an important role in the US-led Operation Inherent Resolve, conducting numerous airstrikes against terrorists in Iraq and Syria.

During the Battle of Baghuz Fawqani, which occurred between February 9 and March 23, 2019, ISIS lost its last territory near Abu-Kamal, Deir Ez-Zur, Eastern Syria. During this final battle for the liberation of territory controlled by these terrorists, the FASF's Rafale Bs from EC 1/4 'Gascogne' in Jordan conducted numerous airstrikes in the region.



Two Rafale Bs of the 4th Fighter Wing (323/4-HT and 333/4-IH) both carrying TALIOS targeting pods and three external tanks, ready for take-off from H5 for a routine armed patrol over Syria in June 2024. The first aircraft has four AASM 250kg bombs and the next has four GBU-12 Paveway IV laser guided bombs *FASF*



Rafale B of the 4th Fighter Wing (323/4-HT) during pre-flight checks at H5 AB before an armed patrol, carrying an MICA-IR IRSRAAM, a MICA-EM ARHMRAAM and four AASMs, July 2024 *French Air and Space Force*

Even after the liberation of this final ISIS pocket, FASF airstrikes against ISIS continued until the summer of 2021. On July 6, 2020, Opération Chammal entered its final phase, known as 'Stabilisation'. However, it was not yet time for the withdrawal of French forces from the region. Two months later, the first group of four Rafale Bs modernised to F3R level arrived in Jordan. On November 24, an Airbus A400M of the FASF brought a pair of TALIOS (Targeting Long-range Identification Optronic System), which were used by two of the Rafale Bs.

On March 19, 2021, the last known airstrike of the FASF Rafale B F3s involved in the Stabilisation or second phase of Opération Chammal was carried out. The aircraft conducted a precision strike on a group of ISIS terrorists as part of a close-air-support (CAS) mission in support of a group of US Army Special Forces at the Iraq-Syria border.

Rafale Bs against Iranian missiles

As the French Armed Forces continued their military presence in Iraq and Syria in support of the US-led Operation Inherent Resolve, it was necessary for the FASF to keep a detachment of six Rafale Bs or Cs at the H5 (Al-Azraq/Prince Hassan) air base in Jordan. Once focused on dealing with the threat of ISIS, they became engaged in armed patrols for protection of the French forces and their American and Kurdish allies from the threat of the Iraqi and Syrian proxies of the Islamic Revolutionary Guard Corps Quds Force (IRGCQF) in Iraq and Syria.

Armed combat air patrols (CAPs) of the French Rafales always involved two aircraft, one usually for air-to-air missions, the other for air-to-ground missions. One aircraft carried two MICA-IR infrared-guided short-range air-to-air missiles (IRSRAAMs) and two MICA-EM active-radar homing medium-range air-to-air missiles (ARHMRAAMs) while carrying two external fuel tanks and a TALIOS targeting pod. The other aircraft carried a MICA-IR, a MICA-EM, two AASM-250 precision-guided bombs and a Reco NG reconnaissance pod.

A Rafale B of the 4th Fighter Wing armed with four AASM-250 precision guided bombs receiving fuel from a KC-135RG of the FASF (497/31-CM) during its last deployment to Al-Udeid AB, Qatar, in July 2024 *FASF*

KC-135RG (497/31-CM) deployed for the last time to Al-Udeid AB, Qatar, last July to support Opération Chammal *Babak Taghvaee*

The multi-camera/multi-lens Reco NG reconnaissance pods installed on the Rafale Bs play an important role in monitoring ISIS terrorists in Iraq and Syria. The Rafale B/Cs on deployment at H5 AB, Jordan, perform tactical reconnaissance missions by means of these pods almost once a week *Babak Taghvaee*

This Rafale B (336/4-IB) was one of the four examples present at H5 when the IRGCASF conducted Operation True Promise 1 against Israel on April 13, 2024. They were immediately scrambled to shoot down tens of Iranian OWA drones and LACMs bound for Israel *Babak Taghvaee*

During their CAP missions, the Rafales photographed a majority of the deserted areas in Eastern and Central Syria as well as Western Iraq almost three to four times a week. The images taken by their reconnaissance pods allowed French forces and their allies to monitor not just ISIS terrorists, but also the activities of the IRGCQF and its foreign proxies which posed a threat to the US Armed Forces present in the Deir Ez-Zur region.

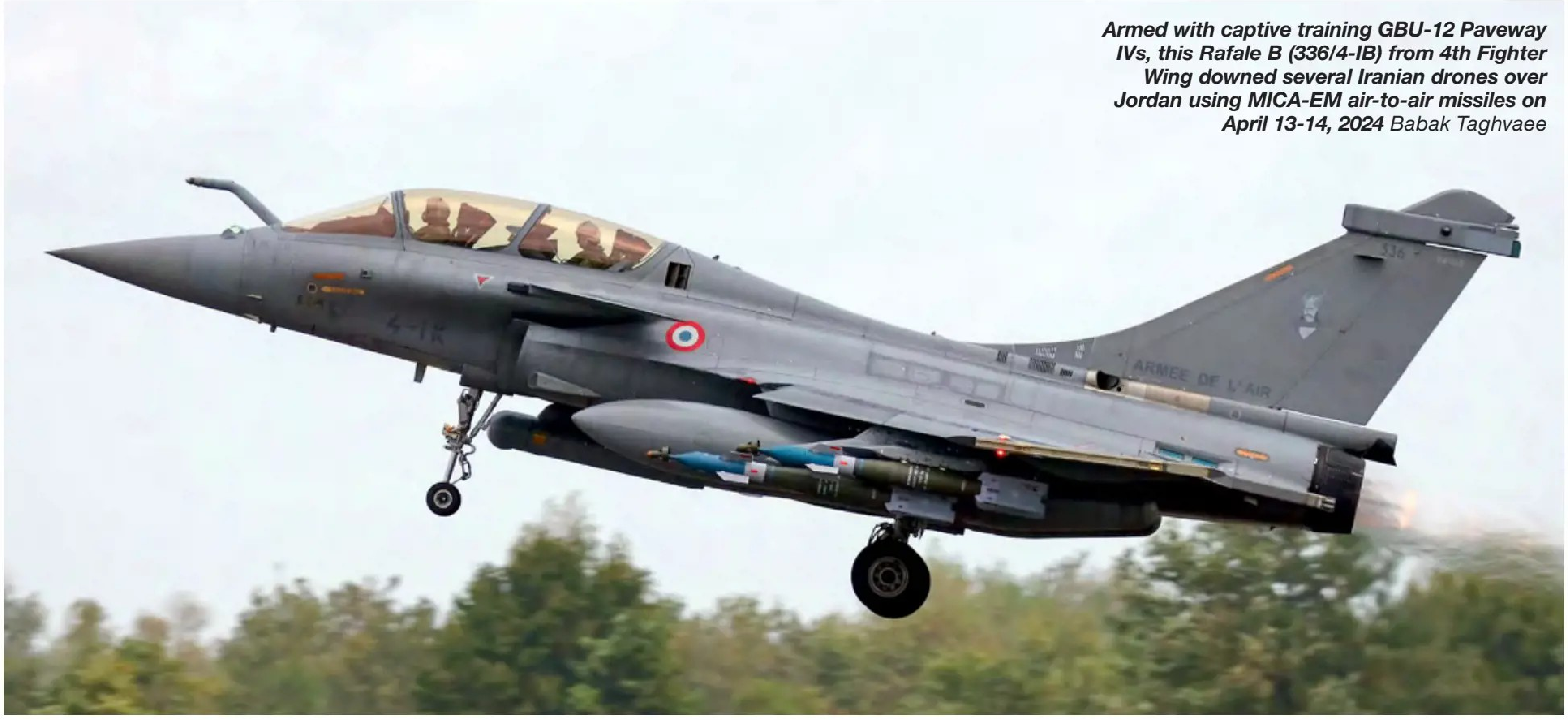
On the evening of April 13, 2024, the French detachment at the H5 air base was put on high alert as the Islamic Revolutionary Guard Corps Air and Space Force (IRGCASF) was preparing to launch its first direct attack from Iran at Israel. That evening, four Rafale Bs (307/4-IA, 323/4-HT, 333/4-IH and 336/4-IK) from the 4th Fighter Wing were armed with six air-to-air missiles, two MICA-IRs, two MICA-EMs and two Meteors each.

At night, the IRGCASF launched its retaliatory Operation Honest Promise (also known as True Promise) during which it launched 170 drones plus more than 30 cruise missiles and 120 short-range ballistic missiles at Israel. Right after the launch of the drones and cruise missiles, a large number of USAF F-15Es and F-16CMs on deployment at Muwaffaq Al-Salti AB in Jordan and Prince Sultan AB in Saudi Arabia left their bases. They were joined by two French Rafale Bs from H5.

Supported by USAF KC-135R/Ts over Jordan, the Rafale Bs conducted a CAP mission to deal with the threat of the Iranian Paveh cruise missiles and Shahed-131/136 one-way attack (OWA) drones. An unknown number of OWA drones and cruise missiles were shot down by the first pair of Rafale Bs. The second pair left H5 to replace them almost two hours after the start of the operation. As of January 2025 when this report was written, the French Ministry of Armed Forces has not revealed the exact number of drones and cruise missiles shot down by these Rafale Bs in an attempt to avoid provoking Iran's Islamic regime.

Latest involvement of Rafale Cs

The four Rafale Bs that took part in the CAP missions on April 13-14, 2024, arrived at H5 on March 5, 2024, replacing four Rafale Cs of the 30th Fighter Wing (including 119/30-IX).



Armed with captive training GBU-12 Paveway IVs, this Rafale B (336/4-IB) from 4th Fighter Wing downed several Iranian drones over Jordan using MICA-EM air-to-air missiles on April 13-14, 2024 *Babak Taghvaee*

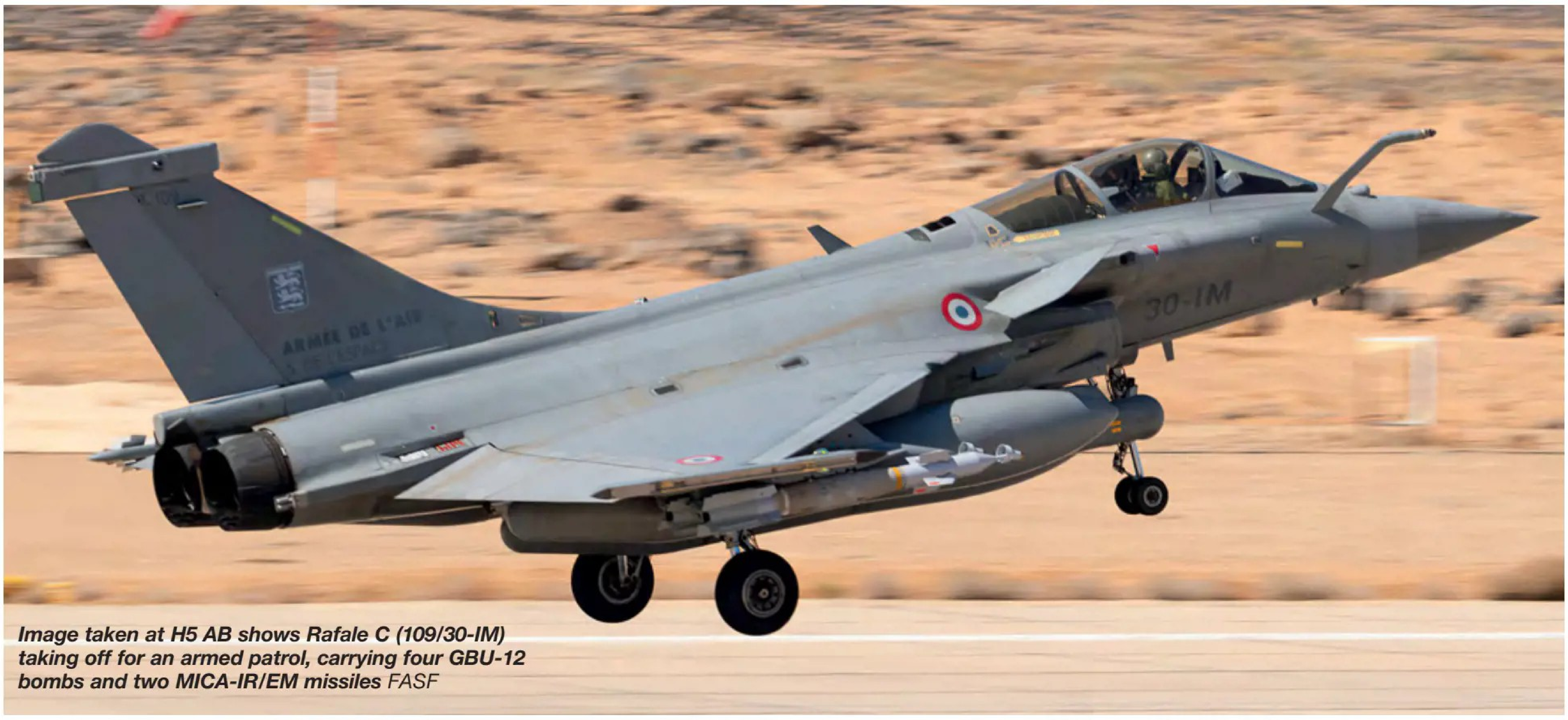
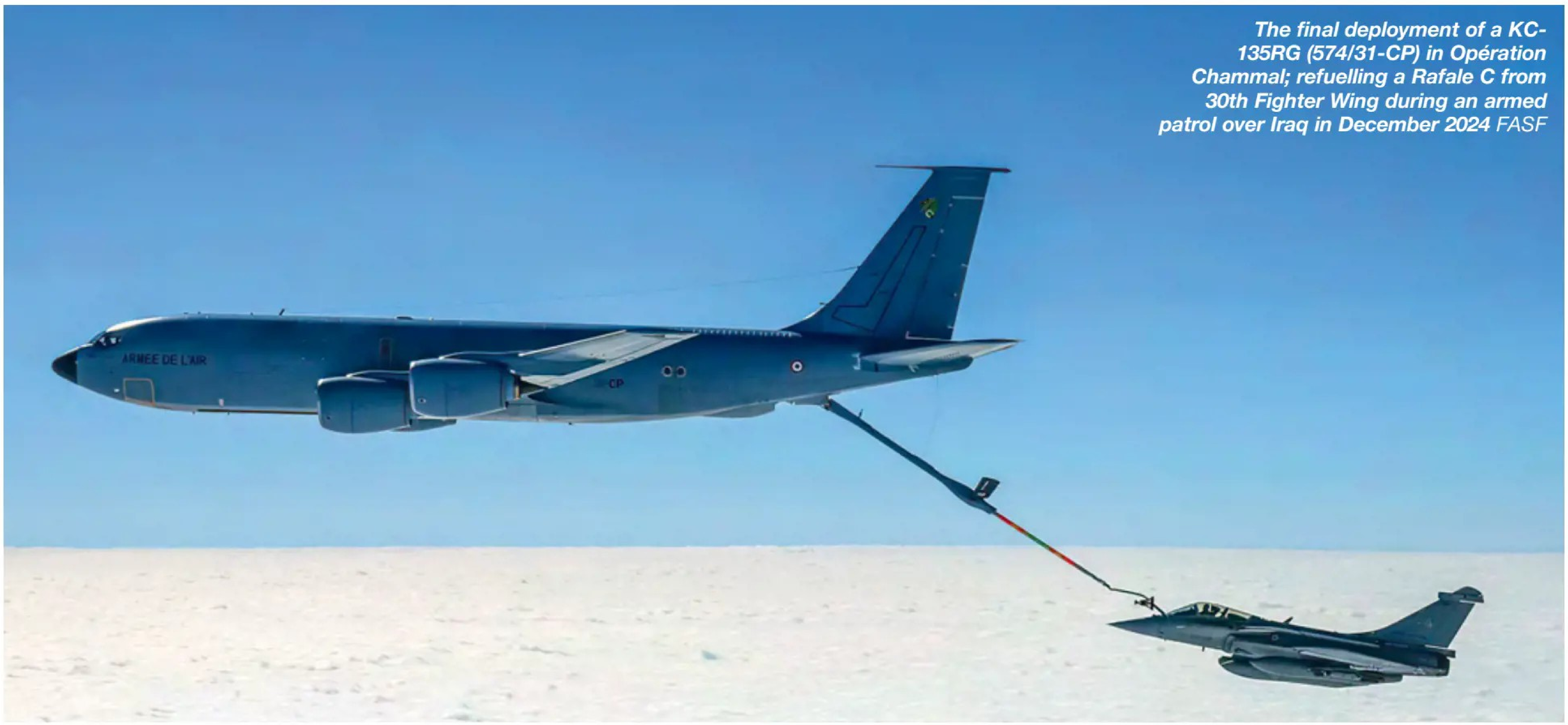
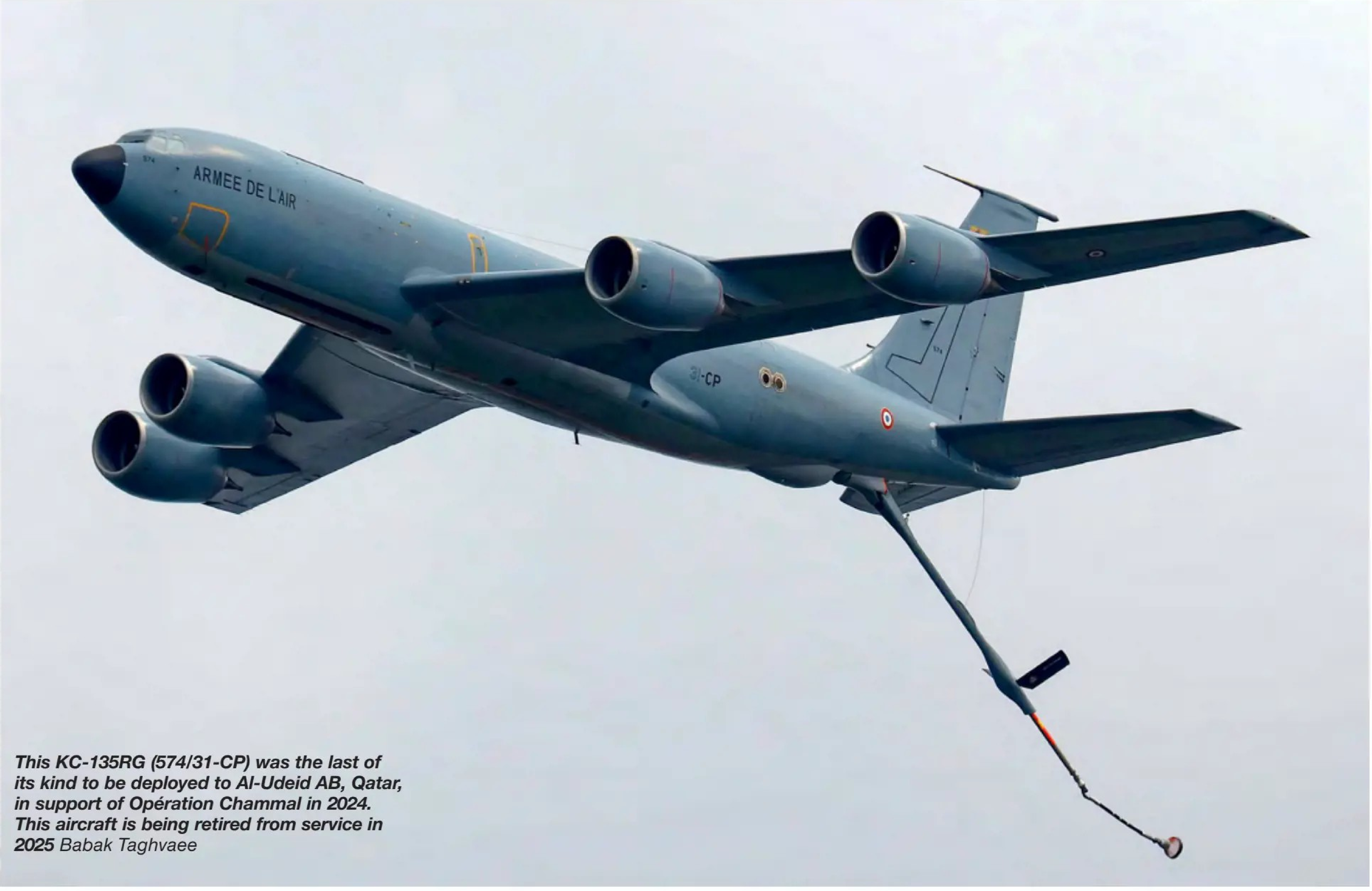


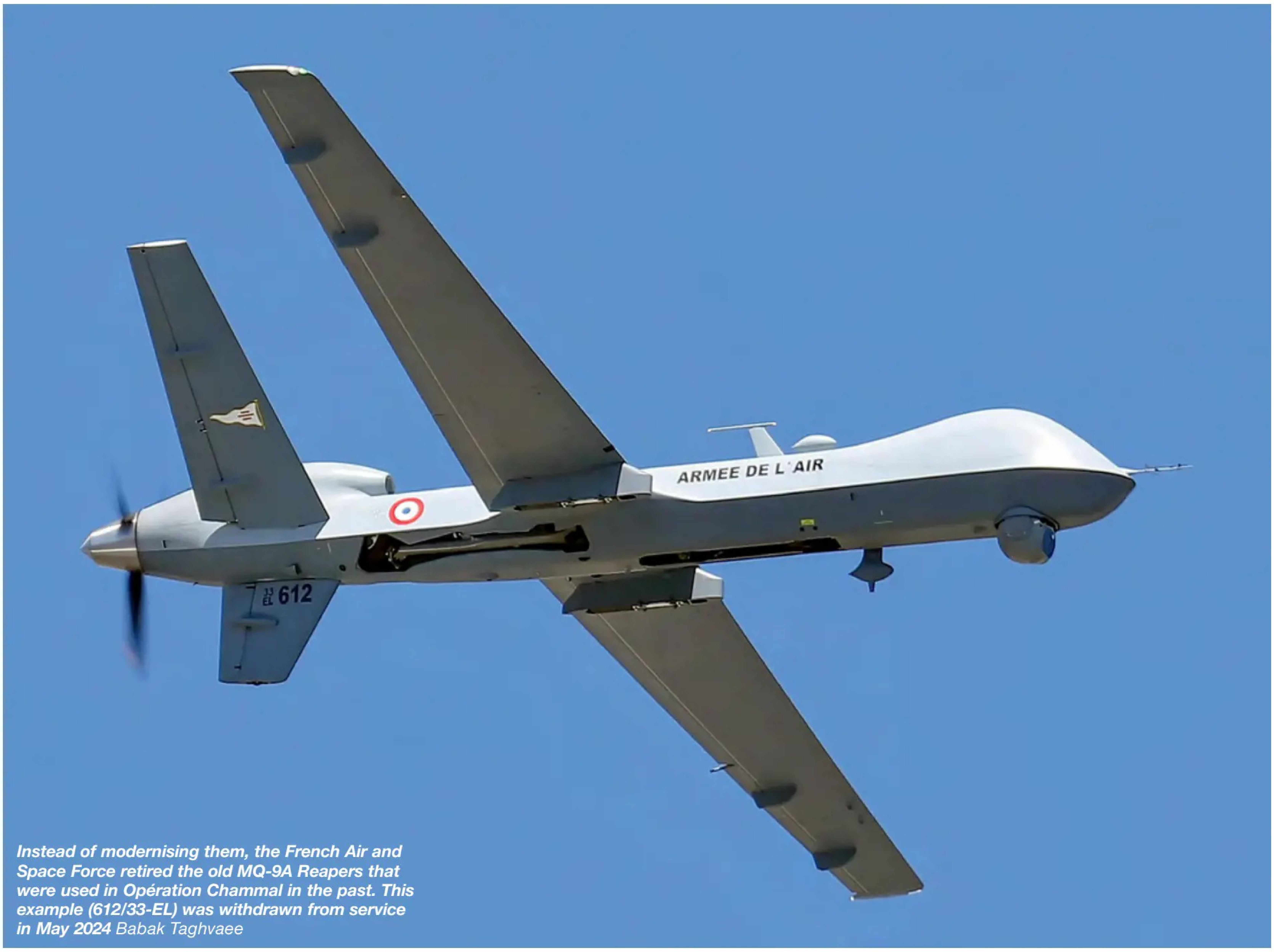
Image taken at H5 AB shows Rafale C (109/30-IM) taking off for an armed patrol, carrying four GBU-12 bombs and two MICA-IR/EM missiles *FASF*



The final deployment of a KC-135RG (574/31-CP) in Opération Chammal; refuelling a Rafale C from 30th Fighter Wing during an armed patrol over Iraq in December 2024 *FASF*



This KC-135RG (574/31-CP) was the last of its kind to be deployed to Al-Udeid AB, Qatar, in support of Opération Chammal in 2024. This aircraft is being retired from service in 2025 *Babak Taghvaee*



Instead of modernising them, the French Air and Space Force retired the old MQ-9A Reapers that were used in Opération Chammal in the past. This example (612/33-EL) was withdrawn from service in May 2024 *Babak Taghvaee*

They remained in Jordan until their places were taken by four Rafale Cs of the 30th Fighter Wing in September 2024 (109/30-IM, 116/30-IU and 139/30-GR are known to have been among them). During their six-month deployment in Jordan, the four Rafale Bs of the 4th Fighter Wing participated in 12 exercises with the Iraqi Armed Forces, almost two per month. These Rafale Bs and their crews also took part in similar exercises with their American and Jordanian counterparts in Jordan during their six-month deployment.

In addition to their daily combat air patrol missions and tactical reconnaissance missions, the four Rafale Bs participated in seven dissimilar air combat (DACT) exercises with F-16C/Ds from the Iraqi Air Force's 9th Fighter Squadron, one combat search and rescue (CSAR) exercise of the Iraqi Air Force (IQAF) involving UH-1H 'Huey' II helicopters of 2nd Squadron, three IQAF air defence exercises and one large-scale exercise of the Iraqi Army. During these exercises, the Rafale Bs acted as Red Air, or Aggressor, allowing Iraqi fighter pilots, fighter control officers and air defence system operators to practise a variety of missions. These exercises also involved ten different pilots and nine weapon system officers from the FASF's 4th Fighter Wing.

The four Rafale Cs that arrived in Jordan on September 5, 2024, also took part in several monthly bilateral training exercises involving IQAF F-16C/Ds. These exercises were carried out for the first time in 2023 as part of Partner Nation Integration Training programmes aimed at improving interoperability between French and Iraqi fighter pilots and promoting Rafale B/Cs to the Iraqi Armed Forces. Partner Nation Integration training flights have been beneficial not only for fighter pilots of the two countries but also for traffic control and radar system operators of the IQAF.

As of January this year, 14 DACT missions were carried out, each involving two French Rafale Cs and two Iraqi F-16C/Ds. These missions took place on September 26, October 2, 4, 14, 17, 22 and 29, November 5, 21, 25, 26 and 28, December 3 and 10, 2024. The Iraqi F-16s were equipped with CATM-9M Sidewinder captive training IRSRAAMs, while the French Rafale Cs carried a single captive training MICA IR SRAAM. Between September 19 and December 12, these Rafale Cs logged 790 flying hours in 176 combat sorties. During many of them, they were refuelled by the French KC-135RG and Airbus A330-243 MRTTs, or the USAF's KC-135R/T tankers.

New round of airstrikes

On November 27 last year, Israel's Operation Northern Arrow in Southern Lebanon ended in a ceasefire between the Israeli Defence Force and the Hezbollah terrorist organisation. On the same day, a coalition of the Turkish-backed Syrian National Army (SNA), Hayaat Tahrir Al-Sham (HTS) terrorist organisation and several other Al-Qaeda affiliated groups launched a military offensive against the Syrian Arab Army in Idlib and Aleppo. They quickly took over Aleppo then moved south, resulting in the takeover of Damascus and the subsequent defection of Bashar Al-Assad to Moscow.

From early December, when the Syrian Arab Army lost control over central Syria, the secret cells of ISIS in several cities and villages in central and southern Syria were activated. They gathered and some of them joined HTS militants and assisted in the release of their imprisoned members from various prisons across Syria. Before long, they reorganised, forming armed units that reportedly conducted terrorist attacks on civilians such as farmers and shepherds, killing or kidnapping them.

Fearing a rapid surge of terrorism at its borders in the Golan Heights, Israeli Defence Forces (IDF) took over Mount Hermon, Queneitra, and several other parts of southern Syria, while the USAF conducted airstrikes on ISIS on December 8, 2024, and then eliminated the new leader of the terrorist group, Abu Yusif aka Mahmud, in Deir Ez-Zur on December 19, 2024. Soon after, the FASF's contingent in Jordan joined the battle, using not just its Rafale Cs but also the sole MQ-9A Reaper armed drone of Escadron de drones 1/33 (Drone Squadron 1/33, ED 1/33) 'Belfort', which arrived at H5 air base in November.

On December 29, 2024, the MQ-9A deployed in Jordan flew a surveillance mission over Syria, during which its operators detected a building used by ISIS terrorists as a command post almost 15km north of Al-Waer in the Syrian desert. Several minutes after its detection, a Rafale C carrying precision-guided bombs targeted and destroyed the building. This marked the beginning of a new phase of Opération Chammal.

Since the beginning of this year, the FASF has increased the number of combat sorties over Syria. During these missions, Rafale C pilots not only search for ISIS terrorists, but are also instructed to confront Turkey-backed HTS and other Al-Qaeda affiliated or non-affiliated militants if they pose threats to US Army Forces present in the eastern Euphrates. During their CAP missions over Iraq and Syria, French Rafale C pilots co-operate and co-ordinate their missions with the USAF, which has A-10Cs and F-15Es on patrol over the same regions **afm**

ARMEE DE L'AIR

One of the MQ-9A Reaper Block 5ERs of the FASF's ETOD 3/33, often deployed to H5 in support of Opération Chammal. Currently, one of them is on deployment there Babak Taghvaee

Last mission for French Stratotankers

For the final time in the history of the FASF's Escadron de ravitaillement en vol 4/31 (Air Refuelling Squadron 4/31, EVRT 4/31) 'Sologne', the last operator of Stratotankers in the FASF had one of its three KC-135RGs (574/31-CP) deployed to Al-Udeid Air Base between November 4 and 28, 2024. Two days after its arrival at Al-Udeid, the aircraft supported a joint training exercise of the FASF and the Qatar Emiri Air Force involving two Rafale Cs of the EC 1/7 'Provence' flown from Al-Dhafra AB in the UAE and two Rafale EQs from Tamim AB. Two one-hour flights were carried out by the KC-135RG on November 6 and 7.

On November 10, the KC-135RG flew to H5 AB in Jordan and returned to Al-Udeid the next day. On November 12, the aircraft logged its first mission in support of Opération Chammal, during which it refuelled two Rafale Cs during their six-hour armed patrol mission over Iraq and Syria as part of Opération Chammal. The Rafale Cs flown from H5 air base each had six air-to-air missiles and were patrolling over Iraq and Syria as part of missions to deter aerial threats caused by the IRGCQF and its proxies. Similar six-hour inflight refuelling support missions were carried out by the KC-135RG on November 13, 15, 16, 19 and 22.

On November 25, the final mission of the KC-135RG on deployment at Al-Dhafra was carried out in support of Rafale Cs of the EC 1/7 Provence and F/A-18C/Ds of the Royal Kuwaiti Air Force participating in a joint exercise in the northwest of the Persian Gulf. Three days later, the aircraft flew back to its home base, Base Aerienne 125 (Air Base 125, BA125) Istres-Le Tube. This marked the end of the deployments of the French Stratotankers to the Middle East.

Last year, the EVRT 4/31 had another one of its KC-135RGs deployed to Al-Udeid AB. The aircraft (497/31-CM) flew to the base on July 22. During that deployment, the aircraft only logged two inflight refuelling support missions, refuelling Rafale Bs of the FASF's 4th Fighter Wing on deployment in Jordan in support of Opération Chammal on July 25 and 27. The aircraft was finally redeployed back to BA125 on July 28. As of January 2025, this aircraft, alongside two other examples (525/31-CN and 574/31-CP), was still in service, awaiting delivery of two A330-243s under conversion into MRTTs in Spain before being retired from service.

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For three weeks each year, pilots of the NH-90s from the Swedish Armed Forces practice mountain training skills in Abisko, northern Sweden. **Martin Scharenborg** and **Ramon Wenink,** visited the Swedish helicopter detachment in the high north to report on the specific challenges and experiences with the NH-90 helicopter

In the far north of Sweden, near the border with Norway, lies the rugged Abisko National Park. This 29.73 square-mile nature reserve, located in the province of Norbottens Län, is approximately 62 miles (100km) northwest of Kiruna and marks the start of the renowned Kungsleden, the most famous hiking trail in Sweden. Here begins a uniquely rugged and varied landscape with towering mountains (sometimes referred to as the Swedish Alps), including the Kebnekaise, which at 6,879ft (2,097m) is the highest peak, along with a vast lake district and several rivers. In the small village of Abisko, home to just under 100 residents, there is a modest helicopter airfield with only a few parking pads. Throughout the year, this airfield is primarily used by civilian helicopters for sightseeing tours, police missions, medical flights, and the resupply of people in hard-to-reach areas. Each year, helicopters from the 1st Helicopter Squadron (1.Hkpskv) arrive here for three weeks to enhance their skills in Mountain Flying (Fjällflygning). The 1st Helicopter Squadron, operating the Hkp.14E – the Tactical Troop Transport version of the NH-90TTH (TTT) – is based at Luleå-Kallax Air Force Base. With a primary role in (Combat) Search and Rescue (SAR), Medical Evacuation, and Troop Transport, the squadron is furthermore tasked with conducting mountain training missions on the Hkp.14E.

Introducing the NH-90

In 2001, the Swedish Armed Forces signed a contract to deliver 18 NH-90 helicopters, with initial deliveries planned for 2005 and the last airframe scheduled for 2013, to replace the ageing Hkp.10 (Super Puma) helicopters. Of the 18 helicopters, 13 were ordered in the Tactical Troop Transport (TTT) configuration, and five in the Anti-Submarine Warfare (ASW) configuration. The Swedish Armed Forces also requested a so-called Higher Cabin Version measuring 5ft97in (1.82m) instead of the standard 5ft2in (1.58m). These specific requirements contributed to delays in the delivery of the first NH-90s. It wasn't until 2005 that the first test flight of the 'HCV' version could take place, and the helicopter was subsequently delivered in 2007, after which certification by Försvarets Materielverk (FMV) had to follow. Due to certification delays, the first four Hkp.14s could only be delivered to the Swedish Armed Forces in the spring of 2011, albeit in significantly simplified configurations (Hkp.14A/B), followed by an Hkp.14C later that year. These versions lacked most of the tactical mission requirements for their intended roles. The delays ultimately forced the Swedish Armed Forces in 2010 to place an urgent order through the Foreign Military Sales (FMS) program for 15 Sikorsky UH-60M Black Hawk helicopters (Hkp.16) in

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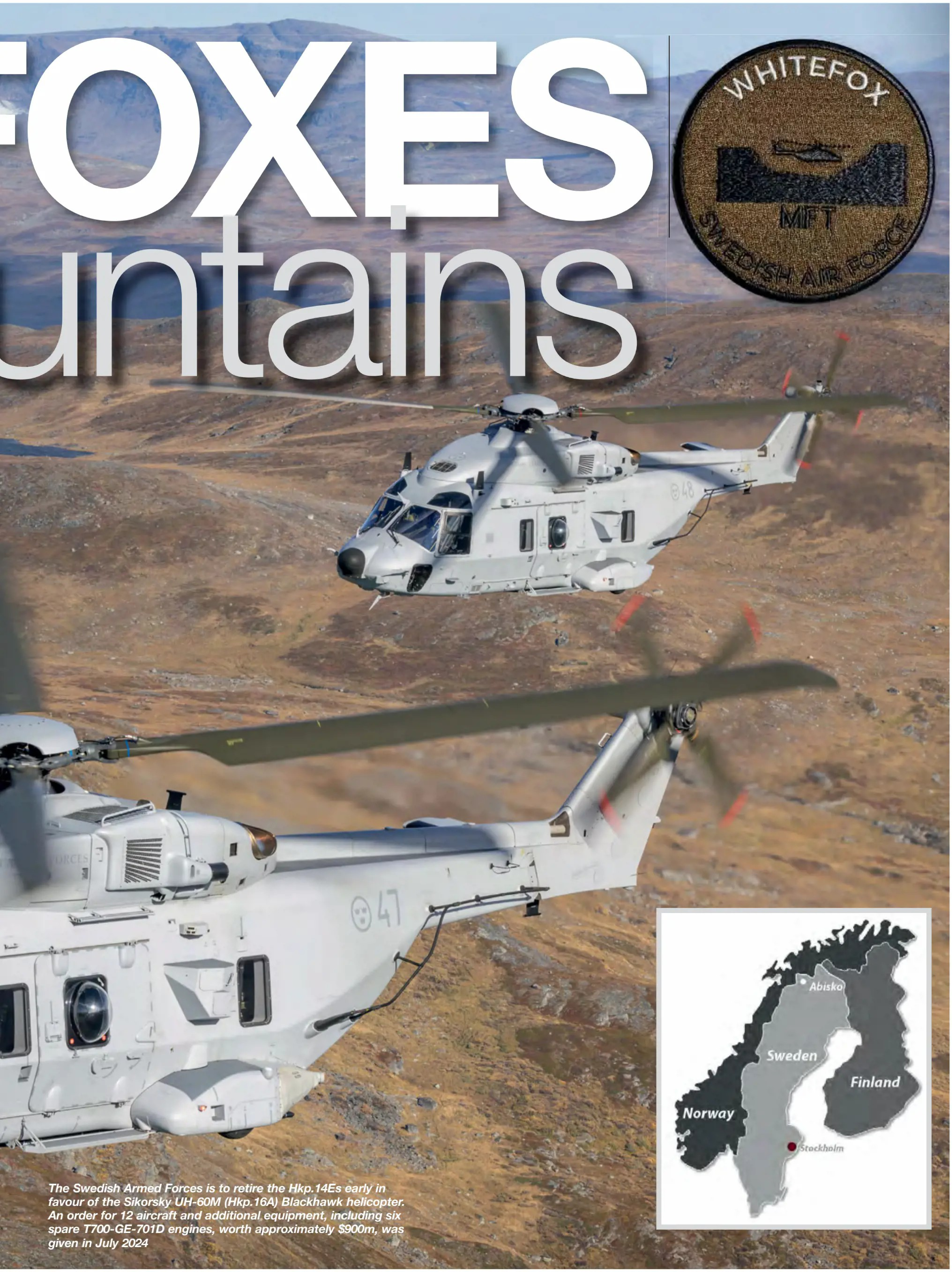
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The Swedish Armed Forces is to retire the Hkp.14Es early in favour of the Sikorsky UH-60M (Hkp.16A) Blackhawk helicopter. An order for 12 aircraft and additional equipment, including six spare T700-GE-701D engines, worth approximately $900m, was given in July 2024

During Mountain Flying Training in Abisko, a wide variety of missions are being flown that also include hot-refuelling on the helipad. Here a Finnish Armed Forces NH-90 is being refueled after a mission in northern Sweden together with Swedish NH-90

During the deployments to Abisko, the aircrew must be prepared for every situation, even a malfunction of the helicopter in a remote and hard-to-reach location

the MEDEVAC role for the ISAF mission in Afghanistan, replacing the Hkp.10B fleet.

The delivery of the first fully operational version of the NH-90 (Hkp.14D) to the Swedish Armed Forces occurred in December 2013. Shortly thereafter, the requirements for the NH-90 fleet were revised and NH Industries was tasked with delivering nine TTT/SAR (Hkp.14E) and nine NFH/ASW (Hkp.14F) versions. Five older TTT models were converted for the ASW role. The first ASW variant was delivered to the 3rd Helicopter Squadron at Ronneby-Kallinge Air Base (AB) in 2015, but it wasn't until late 2022 that the first NH-90 in full ASW configuration became operational. The last Hkp.14E, in its final TTT/SAR configuration, entered service in December 2023 with the 1st Helicopter Squadron at Luleå-Kallax AB.

Deployment

For the crews of the Hkp.14E helicopters tasked with (Mountain) Search and Rescue, training in mountainous terrain under varying weather conditions is essential. Due to its location, varied landscape, and often harsh weather, Abisko provides optimal training conditions for the pilots. Although Luleå-Kallax AB is already quite far north, it still takes pilots over an hour to reach the training area. To maximize training time, it was decided not to operate from its home base but to relocate a small detachment specifically for this exercise. However, considerations must be made for the local population, the protected wildlife (especially reindeer), and the tourist season, which means training can be conducted from Abisko airfield for only three weeks annually. Depending on the complexity of the skills being trained, one week is scheduled in the autumn, and two consecutive weeks in early spring, when the training area is still fully covered in snow. For these two deployments, typically two Hkp. 14Es and approximately 50 personnel, including around nine aircrew, are sent from Luleå-Kallax AB. The supporting personnel include security, fire services, refuelling, communications, maintenance, and management from the helicopter squadron. During operating hours they are housed at the adjacent police station in Abisko.

Intensive flying days

The days in the far north are utilised intensively, starting as early as 0530hrs when the meteorologist prepares a weather forecast for the entire training area. By 0700hrs, the rest of the personnel are gathering for the morning briefing at 0730hrs, with the first flights at 0900hrs. The average flight duration during the exercise is one-and-a-half to two hours, allowing the next flights to commence at 1130hrs. The final flights of the day begin at 1445hrs, with the helicopters landing no later than 1900hrs. The variety of missions is extensive and includes multi-ship landing training, transporting personnel (for example, police officers) to remote locations, transporting external cargo, and landing on small and challenging sites such as mountain ridges and slopes. Night Vision Goggles are also used, especially during the spring deployment when darkness falls early in

Mountain Flying Training is essential as the 1st Squadron (1. Hkpskv) is also tasked with (Combat) Search and Rescue. The weather in the mountains can be treacherous with hazardous winds and reduced visibility

The Swedish Armed Forces ordered a special High Cabin Version (HCV). The added 24cm (1.58m from 1.82m) results in 24m3 extra working space, which is especially useful during SAR Operations and Tactical Troop Transport

northern Sweden. Since flying in these areas can be demanding, helicopter crews carry tents, sleeping bags, satellite phones, and other survival equipment in case an emergency landing is required in an inaccessible area.

Maj Thomas Palmklint Wing Commander 'Flying' of the 1st Helicopter Squadron at Luleå-Kallax, and advisor for the squadron in flight matters and safety, said: "Our objectives are clear: we have to be able to support ground troops and rescue people all around Sweden. It is really challenging flying in the high mountains. Now it is summertime, it is windy, as well as cloudy. You have to follow the valleys and get familiar with the terrain. Landing can be really challenging sometimes, as winds can change in speed and direction. It can become dangerous if you don't choose the right path and do not read the winds correctly. This you have to practice! In the winter you have an extra

Together with two Hkp.14E (NH-90TTT) helicopters (and sometimes a third 'guest' helicopter), around 50 people are deployed during mountain Flying Training (MFT) at Abisko. The supporting personnel includes aircrew, security, fire services, refuelling, communications, maintenance, and leadership from the helicopter squadron(s)

Weather conditions can be very deceptive in the mountains

Three weeks a year the airport is used by the 1st Helicopter Squadron, operating the Hkp.14E (NH-90TTT), for Mountain Flying Training

feature because everything is white. There are hardly any references and looks can be very deceptive. Sometimes a rock may look small but can be as tall as a house when you are getting closer to it. When the visibility is getting worse, this will be even more expressed. Also landing in the snow creates challenges. Is it icy-snow or is it like powder, which may cause serious problems with the visibility during the white-out landing. More or less; for us, it is familiarisation training to do safe mountain flying. You cannot be fully qualified before you can fly in the mountains in wintertime! In Autumn it is a bonus because it is easier to find your way around. We are therefore aiming for all of our pilots to participate in this training at least once a year."

Palmklint started as a conscript in the Swedish Air Force in the late 1980s and became a fighter pilot on the Saab JA37 and SF37 (Recce) Viggen in 1990 with F4 in Ostersund-Froson. In 1996 he was transferred to F21 to fly the Saab Viggen in all three squadrons, followed by conversion to the Saab JAS-39 Gripen when the Saab Viggen was phased out in the Wing in 2004. With too many pilots on the Gripen and not being able to fill the assigned slots for the Swedish Armed Forces with the International Helicopter Training Centre (IHTC) at Bückeburg in Germany, Palmklint saw an opportunity to take his career in a different direction and became, after a year of conversion at the IHTC in 2011, a helicopter pilot. At first on the Hkp.10 Super Puma and then followed by the NH-90 (Hkp.14), Palmklint accumulated no less than 5,000 flying hours total, of which 1,000 on the Super Puma (HKp.10) and 900 flying hours on different versions of the Hkp.14.

International co-operation has always played an important role during the Mountain Flying Training exercises in northern Sweden. The latest NATO members, Sweden and Finland have been training intensively together with their NH-90 helicopters in Abisko since 2016. This cooperation is highly valued by both Armed Forces

Mountain Flying Training or 'Fjällflygning' is conducted annually from Abisko in northern Sweden by the 1st Helicopter Squadron from the Swedish Armed Forces, flying the Hkp.14E

International co-operation

The Swedish Armed Forces are strongly committed to international co-operation and the Fjällflygning exercise is no exception. In the early 2000s, Norway participated several times in the exercise, and since 2016 the Finnish Armed Forces with their NH-90TTH helicopters of the 2nd Helikopterikomppannia of the Helikopteripataljoona (2.HEKOK/HEKOP) based at Utti AB that is part of the Finnish Army (Maavoimat). The Finnish pilots with their NH-90 have become regular and highly valued guests to these exercises.

According to the Finnish helicopter detachment commander (who prefers to stay anonymous for security reasons): "The Abisko-mountain flying exercise offers us quite a different landscape compared to what we are used to in Finland. In Finland, there is only a small mountain area up north where we can train, and it offers only small mountains. The Kebnekaise mountain area has a lot of challenging landing areas, and the weather can change rapidly. Abisko AB is located near the mountain area, so it is also efficient to train there. The exceptionally strong wind conditions during the exercise were optimal for training since there was a lot of turbulence, updrafts and downdrafts. When operating with helicopters in mountainous areas, you need to be sure that the decided landing site and approach path are suitable for a safe landing. In this exercise, strong wind conditions made it harder since it occasionally pushed the helicopter up to 1,500ft/min. (457m/min.) descend. So basically, one would like to avoid such conditions during the approach. High-density altitude also decreases the performance of the helicopter so there is not that much power reserve on the mountain area.

"In many ways the NH-90 is a capable helicopter and it is highly suitable for mountain flying. The performance of the helicopter is great and the instruments offer the pilot a lot of information about the state of flight. For example, the four-axis automatic flight control system with hovering mode is especially useful in the mountains. Co-operation with the Swedish Air Force is natural since we are both operating the NH-90. It is also wise to compare the operating procedures between the nations and discuss what we have learned from mountain flying exercises and the NH-90," said the detachment commander, who participated during the most recent Fjällflygning-exercise in late 2024 with one NH-90TTH and eight aircrew.

Reliable and capable aircraft

After conducting a thorough inquiry into the capabilities and necessary future upgrades for both the Hkp.14E and Hkp.14F in 2022, the Swedish Armed Forces recommended that the current fleet of 18 Hkp.14 helicopters should be retired early, between 2030 and 2035. The Hkp.14E will gradually be replaced by the Sikorsky UH-60M (Hkp.16), of which an additional 12 units were ordered in July 2024 to supplement the 15 already in service with the 2nd Helicopter Squadron (2.Hkpskv) in Linköping. For the Hkp.14F, a Sikorsky Sea Hawk variant is likely to be procured, with the

The Hkp.14E can be equipped with the Safran 'Euroflir' electro-optical system, and is primarily used during nighttime rescue operations

MH-60R being the leading candidate. However, the 1st Helicopter Squadron (1.Hkpskv) of the Swedish Armed Forces Helicopter Wing (Försvarsmaktens Helikopterflottilj), nicknamed 'Whitefox', is very satisfied with the performance and capabilities of the helicopter.

"We heard about the possible replacement of our NH-90 helicopters. It is right; in the beginning we had some issues with the NH-90. The older versions sometimes had computer problems. With the newest version (Hkp.14E) we hardly have any problems at all. The first version that entered our squadron was the B-version, followed by the -D. The -B was like a Bell 206: it had no maps; it was really basic inside. So, we called the Hkp-14B 'Basic'," said Palmklint laughing. "The NH-90 is really nice to fly as it flies like a small helicopter. We have to tell the students that they should be aware that they are flying a big helicopter and that they should not stick the tail between rocks and trees. For us, it is the first helicopter with an anti-icing system. This means it is very well suited for operations in the north because that system works very well. The Super Puma has it, but our Swedish military versions did not have it, unfortunately. As the NH-90 is a powerful helicopter, we use our cargo hook for sling load operations, and we also use the 2,000-litre Bambi Bucket to fight forest fires. For SAR operations we can fit a hoist on both sides of the helicopter that can carry 270kg, and the heightened cabin gives us more manoeuvring space. A pity is that the Electronic Warfare suite is not delivered yet, as well as the guns in the doors and secure communications. I would miss that on our helicopter when operating it in a hostile environment. In comparison to the HKP.10, the NH-90 is much more powerful and stable, but the big plus for us is the anti-icing system. The NH-90 is working quite well, and we are getting more and more flight hours, so now we have some young pilots in the squadron as well and that is a really good development," adds Palmklint.

Future of mountain training at Abisko

"It was one of the reasons that I joined the helicopter community to help people on the ground instead of flying just over them. When I started flying in the Super Puma, during mountain training a Norwegian guy got into trouble high in the mountains. Not equipped with a winch or SAR-equipped, we were able to get that guy off the mountain. That was a really good feeling for the soul! That is why training is key: you have to be prepared for the unexpected. We recently started night mountain operations with NVGs [night vision goggles], for example, during exercise 'Nordic Response'. In 2025 we will probably also start night operations from Abisko. This will better prepare our pilots for any situation, even in the mountains!" Palmklint concluded. **afm**

International co-operation has always played an important role during the Mountain Flying Training exercises in northern Sweden. The latest NATO members Sweden and Finland have been training intensively together with their NH-90 helicopters in Abisko since 2016

Finnishing Hornets, acquiring Lightnings

Peter ten Berg looks at how the Finnish Air Force is preparing for the F35, as well as integrating itself within the NATO alliance

One of the newest members of NATO, Finland, which joined the alliance in April 2023, could not be described as a newcomer to the established military alliance. This was clear in terms of the Finnish Air Force (Ilmavoimat) aircraft assets when replacing its former Russian-manufactured aircraft like MiG-21 fighters and MI-8 helicopters, with British Hawks, American F/A-18s and European C-295s and NH-90 helicopters. Also, the frequent participation in NATO exercises was a clear sign and highly welcomed by the alliance.

Another step was taken before they acceded to NATO. With the F/A-18 (Hornet) force rapidly approaching the end of their service, the need to find a successor was imminent. This meant the installation of a new project, the HX Fighter program, in which manufacturers were invited to propose a new fighter aircraft for the Finnish Air Force (FAF). After a thorough evaluation process, the F-35 was selected as the best choice. In December 2021, the Government of Finland authorised the Finnish Defence Forces to procure 64 F-35As and initial deliveries are expected to start in the third quarter of 2025. With all these new developments taking place, it was a good time to visit the new Scandinavian NATO member and learn more about their current front line Hornet fighter operations while preparing in parallel for the future arrival of the F-35.

Air Combat Centre

We visited the Tampere-Pirkkala Air Base (AB), about 200km north of the capital Helsinki and the home base of the Air Combat Centre (ACC), the Ilmataistelukeskus. The ACC plays a key role in projects for the Air Force Command to the benefit of the operational units. The invitation to have a closer look and hear more about their F/A-18 operations and F-35 preparations planning, was given during the Frisian Flag (FF) 23 exercise in The Netherlands. Here we talked to former ACC commander LtCol Juuso ‘AMEX’ Ilkka who led the Finnish AF F/A-18 Detachment at FF, about their participation in the exercise. “The FAF’s main focus for the future is the F-35 and with British, American and Dutch forces joining the Frisian Flag exercise with their already operational fifth-generation platforms, it was highly beneficial," said Ilkka, summarizing their participation.

A year later, we were warmly welcomed at Tampere air base by LtCol Jaakko 'AVERELL' Salomäki who became the ACC commander in June 2024. Salomäki, a current F/A-18 pilot who has almost 23 years of F/A-18 experience, as well as with types like the L-70 Vinka and Hawk aircraft, came from the Lapland Air Wing based at Rovaniemi AB. "Coming to the Satakunta Air Wing at Tampere was not new to me," as commander Salomäki explained. "I was based here earlier in my career as the last commander of HävLLv 21, Fighter Squadron 21." FS 21 was an operational fighter unit which achieved the impressive milestone of collecting 44,500 flight hours on the Hornet before the squadron was disbanded in 2014.

"The ACC is not the only flying unit based at Tampere, where you can also find several flights of the Tukilentolaivue, the Supporting Air Operations Squadron (SAOS), flying the C-295M, PC-12/47E and Learjet 35A," Salomäki continued. Although Tampere is the main base for the SAOS, the unit maintains several detachments at other air bases in Finland. The Tampere AB also has a regional civilian aviation function with AirBaltic, maintaining several flights to and from Tampere.

"Our ACC responsibilities reach a wide scope, from supporting air operations for the air force combat capability, up to undertaking research and development projects on behalf of the nation's high leadership," Salomäki said. "Another integral part of the Satakunta Air Wing mission is the development of air warfare tactics and doctrine, which is done in close partnership with universities and

Above: ***An Air Combat Centre F/A-18 during a trial targeting mission*** *All images Peter Ten Berg*

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JAAKKO "AVERELL" SALOMAKI
FINNISH AIR FORCE
AIR COMBAT CENTRE

Right: ***Current ACC and future AWC commander LtCol 'AVERELL' Salomäki*** technology industries. In general, these projects include Operational Testing & Evaluation (OT&E) and Development Testing & Evaluation (DT&E). Additionally, the ACC is in control of creating Tactics, Techniques and Procedures (TTPs) for the operational F/A-18 units. For the majority of these roles, our test flights are essential to carry out evaluations and present findings and conclusions or come up with new advice for procedures. A major project for the ACC was the HX Fighter program, which started in 2015, to select a successor for the F/A-18 and resulted in the procurement decision of the F-35 in 2021."

Salomäki explained that the ACC can make use of all types of aircraft in service within the FAF and can temporarily fly additional aircraft from the operational units for ACC projects. "The unit employs several test pilots who are responsible for the execution of various projects. Furthermore, a number of flight test engineers complete our dedicated unit which employs roughly 60 people in total. A normal route for a future test pilot is to apply for the function while operating in one of the front line units. A thorough and specific assessment procedure is in place and although flight experiences are essential, having high numbers of flight hours is no guarantee of becoming a test pilot. Other selection criteria, like the ability of a pilot to become quickly acquainted with new aircraft and fly them in a matter of weeks, are an important element in the selection procedure as well. Once selected, a pilot will follow a national or international test pilot course. Our test pilots occasionally visit other international test units, to fly a new aircraft in a couple of weeks. The ACC test pilot gives guidance because they are in charge of managing the projects and setting objectives, planning, registration and finally taking care of documenting the findings in reports," Salomäki explained.

The Hornets of the ACC fulfil a major role in preparing for 5th-gen integrated missions

First F-35s for Finland

"After finishing the HX fighter program in 2021, the free ACC capacity was immediately reserved for the various projects which would prepare for the entry of the new F-35 in the FAF," Salomäki said. The current overall project planning reveals several specific events, which kick off in 2025 with the delivery of the first fifth-gen aircraft which will be used for training purposes in the USA. This training will take place at the 188th Wing at Fort Smith/Ebbing Air National Guard Base, Arkansas, where training programs for countries like Poland and Germany are also conducted. In 2026 the first F-35 will touch down in Finland for HävLLv 11, Fighter Squadron 11 of the Lapland Air Wing. FS 11 is expected to achieve Initial Operational Capability (IOC) in 2028. The other Finnish operational fighter unit, HävLLv 31, Fighter Squadron 31 of the Karelia Air Wing at Rissala, will receive its first F-35s in 2028. The F-35 will achieve Full Operational Capability (FOC) by the end of 2030. The F/A-18 C/D Hornets will retire in phases and will be completely phased out by the end of 2030, leaving the F-35 as the main fighter for the Finnish Air Force.

"At the end of 2024 the ACC's main focus of creating TTPs for F/A-18s was switching to the F-35," Salomäki explained. "Meanwhile two FENIX F-35 flight simulators have been installed on the base, as a preparation before the first group of Finnish pilots start flying their F-35s in the US in late 2025. Upon their return to Finland, these pilots will start a new and ongoing F-35 training program for the following pilots at Rovaniemi and then Rissala. For fast jet pilot training the FAF uses the BAE Systems Hawk. The aircraft has received several updates over the years, including new digital display cockpit systems, which makes them capable of fulfilling requirements for pilot training on the F-35. Furthermore, the latest development to install Hands On Throttle and Stick [HOTAS] in the Hawks is now running together with strategic partner Patria [formerly Valmet] from Finland."

Once the F-35s have entered service and experience has been gained, it is expected that the trainer aircraft situation will have a future review. Options to replace the Hawks with a new platform or join a combined international training program can be expected to be considered and evaluated. Within NATO, several international pilot training initiatives have been installed in recent years. Due to beneficial elements like shared planning and maintenance, such programs may gain further interest due to the improved cost-efficiency rates.

NATO exercises

According to Salomäki, the ACC and the other FAF operational units will continue to join NATO exercises, like Frisian Flag. "The exercises with F-35 participation of partner nations have a special interest as they improve the general knowledge on how to operate a fourth-gen fighter alongside a fifth-gen fighter for a couple of years, as the ACC wants to learn how to integrate common tactics between both platforms. It is interesting to know that the F/A-18 can carry more weapons than the F-35, which can currently carry only four AMRAAMs in its internal weapons bay.

The flight lines of the ACC at Tampere have some natural, rocky barriers

Tampere hosts several C-295s of the Tukilentolaivue for supporting duties

The ACC fighters expect to fly alongside FAF F-35s upon arrival at Rovaniemi in 2026

However, the sensors of the F-35 provide much more detailed information than the systems of the Hornet do. It will be beneficial to have them fly together so that both can combine the stronger capabilities of the other," Salomäki continued. In 2024 they went to Norway to support the local F-35s Weapon Instructor Course and in the autumn took part in the Cobra Warrior exercise in the UK where the F/A-18s could fly along with RAF and USAFE F-35s. Future exercises to join could be the new Ramstein Flag editions. Salomäki said: "Although there will be only several years that we have F-35s and F/A-18s fly together, the integration of fourth and fifth-gen aircraft remains an essential subject for us as when the FAF Hornets have been phased out, there will remain other partners to integrate with and to make use of each other's strengths." An example will be the integration with neighbouring country Sweden with its Gripen force, or other nations doing their regular Air Policing missions in the Baltics.

After Finland became a NATO member, there were no immediate differences noticed within the operational units. However, in the background, the FAF immediately started with all the preparational efforts which came along with the membership, like the operational planning according to common NATO standards and procedures. "Next to that, we observed other NATO nations showing interest in training together with the Finnish aircraft in Finland. For example, they want to learn how Finland conducts its winter flight operations in the Arctic regions when experiencing freezing conditions throughout the day. Furthermore, the annual Baana highway exercises, conducting flight operations from road strips throughout the country, appear to have international interest," Salomäki remarked. In the last Baana exercise, which ran from August 30 to September 6, 2024, the Finnish aircraft were joined by Eurofighters from Germany and F-35s from the US units flying to and from the Norvatie highway in Rovaniemi and the Hosio highway in Ranua. A year

Some flight lines provide cover, which makes ops in tough winter conditions easier

A 3-ship Hornet formation setting course for a training area in southern Finland

earlier RAF Typhoons and Norwegian F-35s joined the exercise which includes day and night flying. During the exercise the roads are closed for normal traffic and temporary means are installed to make aircraft operations possible in the out of airfield areas. NATO adapted the Baana 2024 exercise as Imminent Field 24.

Another operational element that changed for Finland was its participation in NATO's Air Policing missions, providing adequate air power to member nations without sufficient defensive aerial means. The first deployment took place in the summer of 2024 when several FAF F/A-18s were based in Romania for Quick Reaction Alert (QRA) duties on NATO's eastern flank for two months. In the first week of 2025, Finland started its second Air Policing mission in Iceland. With four Hornets from the Lapland Wing and 50 airmen, the detachment maintains a QRA service out of Keflavik AB for an unspecified period.

In the process of integrating further with other NATO allies, Salomäki was able to reveal a future name change: "In 2025 we plan to replace the name of the Air Combat Centre with Air Warfare Centre. The new name is seen as more common in use with other NATO partner units."

This year and next will be important years, according to Salomäki. Not only for all air force employees, who after all their preparational work, will finally experience the introduction of the first F-35s in the Finnish Air Force, but also for the general public who will see the new fighter joining flights with the F/A-18 in Finnish air space. **afm**

Left: ***The remote location of Tampere is ideal for ACC's regular flight activities***

Right: ***A Satakunta Air Wing crew chief assists the F/A-18 flight crew prior to a test mission***

Integrating F/A-18 weapon load with the F-35s' advanced sensors will be a beneficial improvement

The ACC makes use of F/A-18C and D models on loan from operational units

The city of Tampere will continue to still see the ACC's F/A-18s in its skies for a couple of years

The primary reason for the Norwegian F-35As and NASAMS system presence in Poland, is to protect the logistic hub at Rzeszów Airport

Boosting Poland's defences

Four Royal Norwegian Air Force F-35As deployed to Poland during the first two months of 2025 and Bartek Bera managed to take a ride with them

SINCE RUSSIA launched its full-scale invasion of Ukraine, Poland has rapidly transformed into a frontline state due to its border with the conflict zone. This proximity to the war has shifted Poland's role in NATO from a peripheral member to one of vital strategic importance. A key element of Poland's significance in this new reality is the Rzeszów-Jasionka airport, which has become a central logistical hub for transporting western military aid to Ukrainian forces. The airport facilitates the rapid transit of essential military equipment and supplies, including weapons, ammunition, and humanitarian assistance, directly to the Ukrainian military. The urgency of this logistical effort has triggered an unprecedented military response from NATO, which has bolstered its presence in Poland to safeguard the region and reinforce collective defence principles.

Securing Poland's airspace

As part of NATO's strategy to secure Poland's airspace and provide continuous support against potential Russian threats, the alliance has deployed rotational forces as part of its enhanced air policing mission under Operation Integrated Air and Missile Defence (IAMD). These forces play a crucial role in maintaining air superiority and ensuring the readiness of NATO's eastern flank. A significant step in this effort came in January 2025, when four Norwegian Air Force F-35A fighters were deployed to the 31st Tactical Air Base (TAB) in Poznan´-Krzesiny, taking on 24/7 quick reaction alert (QRA) as part of NATO's IAMD mission. These F-35s brought cutting-edge capabilities to Poland's air defence system, enhancing interoperability with Poland's existing air assets.

The presence of NATO air units in Poland began in 2014 when the Kremlin annexed Crimea, escalating tensions between NATO and Russia. In response, NATO introduced its Baltic Air Policing mission, which initially focused on the security of the Baltic

Break! A Norwegian F-35A and Polish F-16C from 31 Tactical Air Base at Poznań-Krzesiny split over the clouds of Poland. The latter is carrying a rarely seen air-to-air configuration of five training AMRAAMs (CATM-120) and one Sidewinder (AIM-9X CATM)

States. This was strengthened by deploying additional detachments to the 22nd TAB in Malbork, which became a secondary site for NATO's air policing efforts to Siauliai Air Base, Lithuania). Over the years, personnel from various NATO countries, including France, Italy, Turkey, and the Netherlands, have rotated through Malbork as part of these efforts.

The mission primarily focused on preventing Russian incursions into international airspace, and monitoring Russian aircraft behaviour, such as the frequent lack of transponders or incomplete flight plans. These incidents posed a serious risk to air traffic and the safety of neighbouring countries.

However, it wasn't until Russia launched its full-scale invasion of Ukraine in February 2022 that NATO's air defence efforts in Poland were significantly ramped up. In the face of Russian air and missile threats, the Polish Air Force required additional support to defend its eastern border from potential violations of Polish airspace by Russian tactical aircraft and cruise missiles. To address this need, NATO deployed USAF aircraft on a rotational basis, including F-15Cs (a final combat deployment of 493rd Fighter Squadron (FS) from RAF Lakenheath), F-15Es, F-22s (90th FS from Elmendorf), F-16C/Ds (both Aviano and Spangdahlem-based units), and F-35As (495th FS from RAF Lakenheath), which operated from the 32nd TAB in Łask (home of 16 Polish F-16 Block 52+ from 'Dragons' 10th Fighter Squadron) as part of NATO's IAMD. For many months, these aircraft conducted air patrols, surveillance, and rapid-response missions to monitor Russian air activity and safeguard Polish airspace.

Providing further support

In response to this growing threat, Norway's government confirmed in December 2024 that they would provide further support to the eastern NATO flank by deploying both air and missile defence capabilities to Poland. This support included four Norwegian F-35As and NASAMS (Norwegian Advanced Surface-to-Air Missile System) batteries.

Norwegian Defence Minister Bjørn Arild Gram made it clear that Norway's contribution aimed to help ensure that Western military aid to Ukraine could reach its destination safely: "Ukraine remains in critical need of military support, with Poland as the most critical logistics hub. This way, Norway contributes to ensuring that aid to Ukraine reaches its destination." To facilitate this effort, NASAMS batteries were deployed near Rzeszów-Jasionka Airport, where they joined other air defence systems from NATO and partner countries stationed there since the invasion of Ukraine in February 2022. The Norwegian contingent currently in Poland numbers approximately 100 personnel (that includes NASAMS crews and F-35 personnel from 331 and 332 Squadrons from Orland Main Air Base), reflecting the importance of Poland's role in the broader NATO defence strategy.

The arrival of Norwegian aircraft in Poland marked the beginning of a new chapter for the Royal Norwegian Air Force, as the F-35s began their first operational mission in the region from their deployed location. Prior to this, Norwegian Lightnings had supported NATO's Air Policing mission, including over Iceland in 2023. The Norwegian jets' mission in Poland was set to finish at the end of February 2025.

Poland's growing strategic importance within NATO, especially after Russia's invasion of Ukraine, has underscored

Polish and Norwegian fighters conducting Combat Air Patrol over Baltic Pipe gas pipeline, showing both countries' commitment to protecting critical infrastructure

Brothers in arms – two generations of Lockheed Martin's most popular multirole fighters. The F-35A and F-16C's synergy effect is based on mutual weapon resource management, where the F-35 with limited air-to-air loadout may acquire targets for F-16s, carrying up to six air-to-air missiles.

the need for a permanent NATO military presence in the region. The Polish government has long advocated for this, fearing that it would be relegated to second-tier status within the alliance. Russia's aggression has ensured that Poland now plays a central role in NATO's defence strategy, with troops and air units stationed across the country as a visible sign of solidarity and deterrence. With the increasing frequency of combat air patrols and air policing missions along the Ukrainian border, NATO's role in Poland continues to evolve.

CAPs along Russian-Polish border

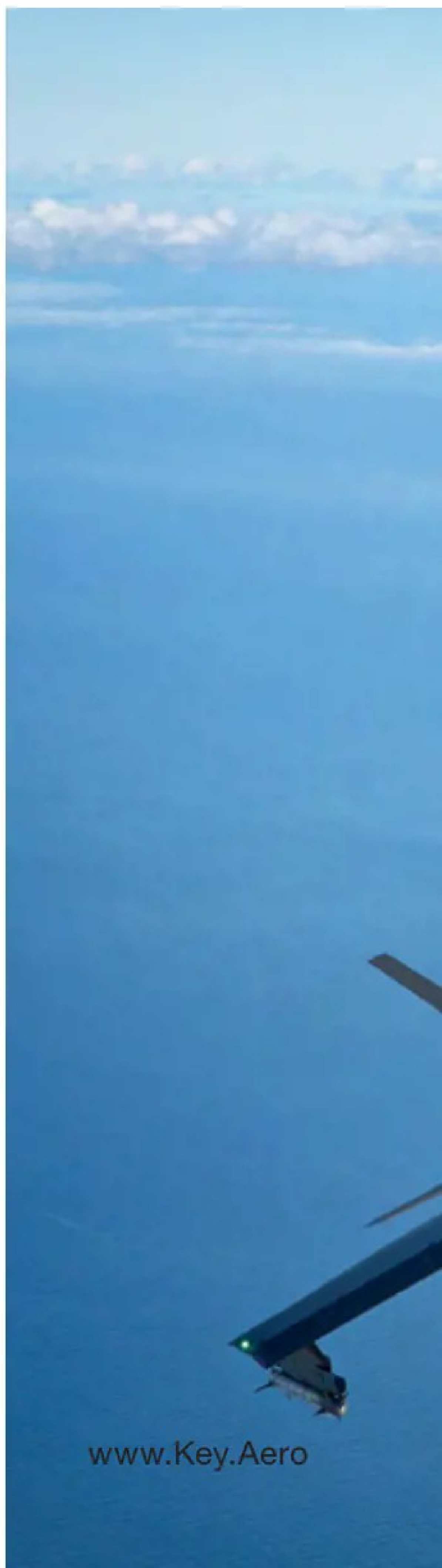
At the 31st TAB in Poznan´-Krzesiny (where 32 Polish F-16C/D Vipers are based with 3rd Fighter Squadron 'Ravens' and 6th Fighter Squadron 'Tigers'), Norwegian forces have taken on continuous duties as part of NATO's Integrated Air and Missile Defence System (AMD), reporting to NATO's Combined Air Operations Centre (CAOC) in Uedem, Germany. Norwegian fighter jets do not perform their shifts in rotation with the Polish Air Force, but rather alongside them, with the Polish Air Force operating two F-16 bases in Krzesiny and Łask and a MiG-29 base in Malbork. Prior to the outbreak of full-scale war in Ukraine, NATO's scramble missions were largely limited to responding to potential Russian incursions over the Baltic Sea. Since February 2022, NATO aircraft have increasingly been dispatched to conduct combat air patrols along the Polish-Ukrainian border, responding to Russian strategic aviation activity and the potential threat of cruise missile strikes on Ukrainian cities. Although these incursions are typically brief, lasting only a few seconds, there have been several incidents in which Russian cruise missiles, such as the Ch-101, have crossed into Polish airspace.

As a result, NATO aircraft, including Norwegian F-35As, often remain on standby in the area for extended periods, sometimes requiring air refuelling. Tankers, mainly KC-135Rs from the 100th Air Refuelling Wing at RAF Mildenhall, have been deployed to ensure operations continue uninterrupted. The Polish Operational Command, which is responsible for protecting the country's borders, issues alerts to the public when these operations are underway and when they have been concluded. The first scramble mission involving Norwegian F-35s took place on January 15, 2025, (also confirmed by NATO AIRCOM) and further similar missions according to Polish Ops Command continued on February 1, 11 and 25. While no violations of Polish airspace were reported during these incidents, the ongoing presence of NATO aircraft demonstrates the alliance's commitment to safeguarding the region.

Training sorties

Beyond these alert missions, Norwegian F-35As have also conducted extensive

On QRA missions the Norwegian Lightnings were carrying two AIM-9X Sidewinders on external stations and up to four AIM-120 AMRAAMs in the internal weapons bay



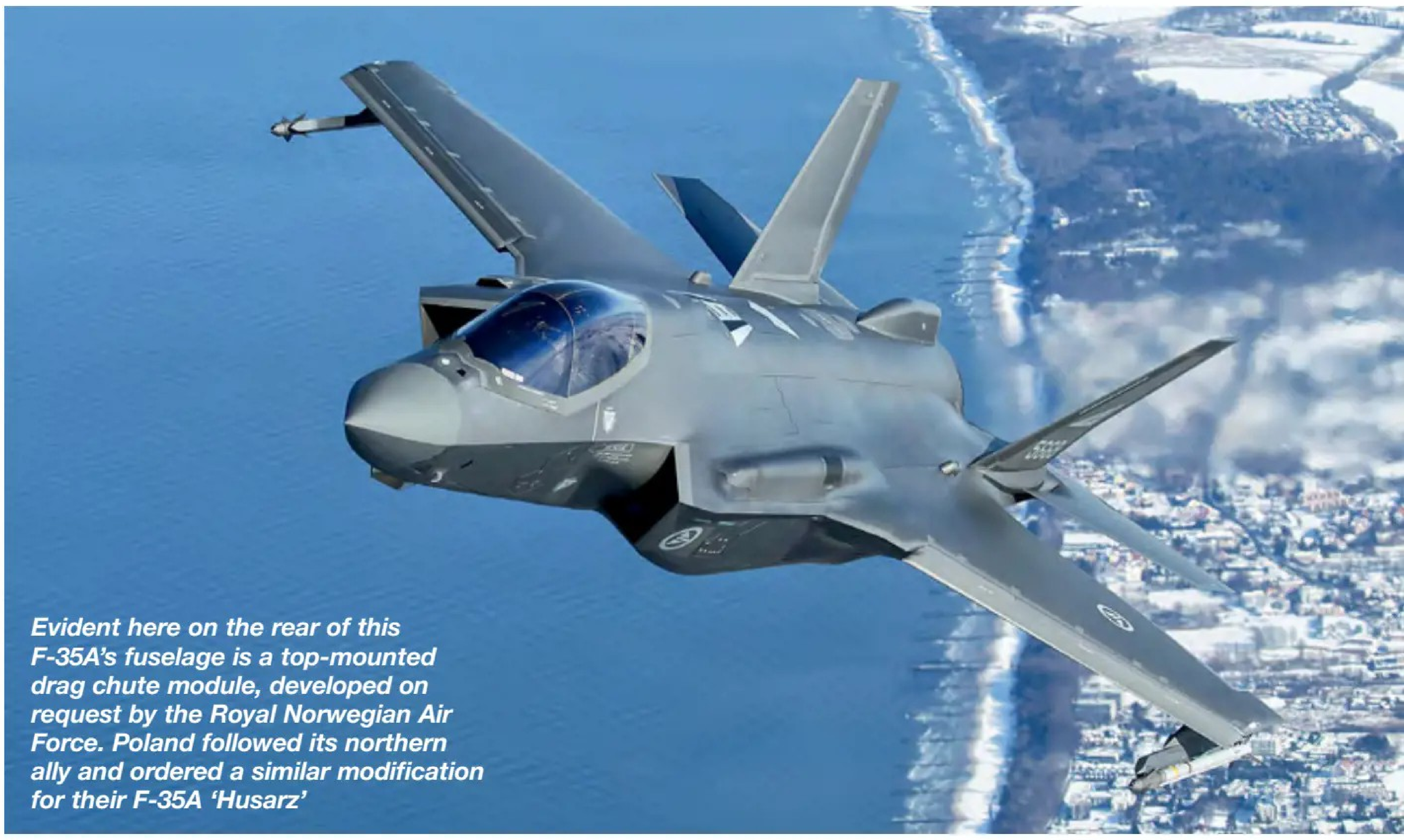
Much of NATO's efforts are strengthening and developing tactics through the strengths of the fourth- and fifth-generation fighters.

training flights with their Polish counterparts. These 'Tango scramble' missions offer an invaluable opportunity for both nations to strengthen their cooperation and build interoperability between their respective air forces. The Polish Ministry of Defence has highlighted the importance of these exercises, noting that they will help prepare Polish forces for the upcoming arrival of their own F-35As, with the first Polish F-35 scheduled to arrive in 2026 (in February 2025 first Polish pilot flew a Lightning II in Fort Smith).

Norwegian pilots have also conducted Basic Fighter Manoeuvres (BFM) missions against Polish MiG-29s, which are expected to retire later this year. Additionally, multiple sorties were conducted with Poznan´-Krzesiny-based F-16s. Sorties included Basic Fighter Manoeuvres, Offensive and Defensive Counter Air in multi-ship formations and Surface Attack. Very often, this training was supported by external assets such as NATO tankers and AWACS or Polish Ground Based Air Defences (GBADs). These training flights are crucial in maintaining readiness and ensuring Polish forces are well-prepared to defend their airspace in cooperation with NATO allies.

While there is no official confirmation what will come after the Norwegians, British officials indicated last year that Eurofighter Typhoon FGR4s will deploy to Poland as part of the Baltic Air Policing mission. Malbork is expected to serve as the base for these aircraft, but the precise timeline for their arrival remains unclear.

Poland's strategic location and commitment to NATO's collective defence efforts have made it a vital ally in the face of Russian aggression. With the ongoing deployment of advanced NATO air assets, such as Norwegian F-35As, and the continuing support of other European allies, Poland remains at the forefront of NATO's defence policy. As tensions continue to rise along the eastern flank, Poland's role will only grow in importance as a critical hub for air and missile defence operations, safeguarding the security of not just Poland but the entire alliance. **afm**



Evident here on the rear of this F-35A's fuselage is a top-mounted drag chute module, developed on request by the Royal Norwegian Air Force. Poland followed its northern ally and ordered a similar modification for their F-35A 'Husarz'

Norwegian F-35As over the former Soviet air base at Bagicz near Kolobrzeg, Poland. From the late- 80s the base housed MiG-23s. It is now privately owned and open for general aviation activities

Baltic defenders

Allies continue to safeguard NATO skies as Italy and France take over Baltic Air Policing Block 67 in Lithuania.

Giovanni Colla and **Remo Guidi** report

The last rays of the day's sun illuminate these Italian air force F-2000s over the Baltic skies. They are both equipped with IRIS-T and AIM-120 missiles, plus Litening V pod under the fuselage *All images Giovanni Colla and Remo Guidi unless stated*

Since its inception in 2004, NATO's Baltic Air Policing mission has been crucial in ensuring the security and sovereignty of the Baltic states' airspace. The mission, now in its 67th rotation, sees Italy and France working side by side to safeguard the skies above Lithuania, Latvia, and Estonia. With operations based at Šiauliai Air Base in Lithuania, this iteration reflects NATO's commitment to collective defence.

Baltic Air Policing was launched as part of NATO's initiative to support the Baltic States following their accession to the Alliance. These countries, lacking advanced air defence capabilities, required the assistance of NATO's more robust air forces. Over the past two decades, 17 Allies have participated in this peacetime defensive mission. Lieutenant General Thorsten Poschwatta, Commander of NATO's Combined Air Operations Centre (CAOC) in Uedem, Germany, emphasised the mission's significance: "For over 20 years, handing over the key to the Baltic Airspace has been the symbol of what this Alliance represents: the

The snow can't stop this F-2000A – the Task Force Air is ready 24/7 to safeguard the Baltic region

Above: ***A Typhoon pilot gets ready to start his Typhoon's EJ200 engines***

Right: ***A French AF Rafale B assigned to EC 02.004 'La Fayette' taxiing out for a training mission***

strong collective will to defend our shared values and ensure durable cohesion."

Italy: Leading with Eurofighters

Dubbed Task Force Air (TFA) 36th Wing – Operation Baltic Thunder II, the Italian Air Force detachment is equipped with four Eurofighter Typhoon (F-2000) aircraft from the 36th Wing in Gioia del Colle, the 4th Wing in Grosseto, the 37th Wing in Trapani, and the 51st Wing in Istrana alongside E-550A Conformal Airborne Early Warning (CAEW) and Beechcraft Super King Air 350ER SPYDR aircraft assigned to the 14th Wing in Pratica di Mare which have operated from Lithuania only during specific periods.

Italy's deployment took the lead in the 66th rotation at Šiauliai Air Base, Lithuania (August – November 2024), succeeding Portuguese and Spanish detachments in mid-2024. During this four-month rotation, the first Alpha Scramble occurred on August 3, 2024, when NATO's Combined Air Operation Centre at Uedem scrambled two Italian Air Force Eurofighter Typhoons in response to potential threats from Russian military aircraft. The Italians identified two Russian MIG-29s flying over the international waters in the Baltic Sea, close to Alliance territory. The Eurofighters escorted the Russian aircraft, demonstrating the high state of readiness and proficiency of the Italian detachment. Under NATO's Air Policing mission, an Alpha Scramble is triggered when an aircraft is flying an invalid or incorrect flight plan; fails to or loses communication with the relevant air traffic control authority; or fails to communicate with the air traffic control authorities using the transponder, an electronic device that emits a four-digit signal called a squawk code.

After surpassing 1,000 flight hours – including the CAEW and SPYDR aircraft's flight hours – conducting 32 Alpha Scrambles, and intercepting 48 Russian military aircraft, the mission has been handed over to the next – and current - Italian detachment and their French colleagues forming the 67th rotation. During the formal handover ceremony, which took place on November 28, 2024, and upon receiving the symbolic key to the Baltic Airspace, the incoming commander, Colonel Roberto Massarotto – Commander of the TFA 36th Wing, highlighted the importance of the ceremony as a testament to NATO's core principles and strength. "This key not only symbolises the unity and purpose of NATO but also represents a great responsibility. Rest assured, we will undertake the task of ensuring Baltic Air Policing with the same commitment we apply to protecting our own airspace," he affirmed.

As geopolitical tensions rise due to the ongoing conflict between Russia and Ukraine, NATO's Air Policing missions have evolved significantly, adopting a deter and defend philosophy and Italy has been actively supporting NATO's Air Policing mission along the eastern flank in recent years. In 2024, Italian aircraft operated out of Malbork, Poland, initially deploying F-35s (see *CAJ* February 2024 issue) and later transitioning to Eurofighters (see *AFM* October 2024 issue). With the 67th rotation the Italian air force TFA 36th Wing continues to demonstrate its commitment to collective defence, underscoring the importance of cohesion and solidarity among Allied nations.

The TFA's mission in Lithuania centres on preserving the integrity of Baltic airspace. Continuous surveillance, rapid response, and the interception of unauthorized aircraft

A Rafale crew prepare for a training mission

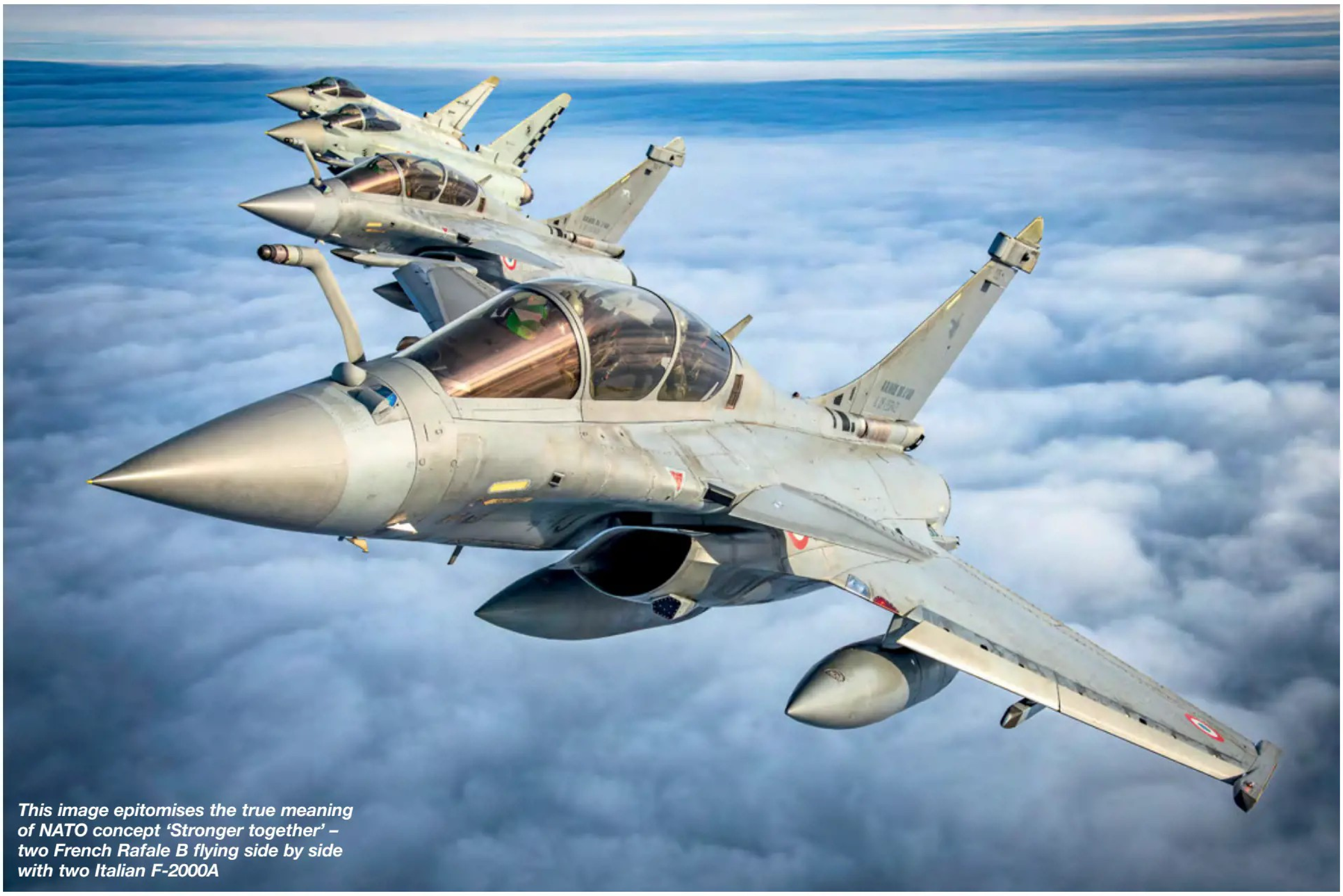
Above: ***French AF detachment commander Major Sanka***

Right: ***Col Roberto Massarotto, Task Force Air 36th Wing Commander*** *Italian Air Force*

are critical components of their operations. Speaking on the heightened importance of Air Policing, the TFA commander highlighted that the ongoing crisis in Ukraine underscores the need to monitor and defend airspace against unconventional threats. “Being here today symbolizes shared responsibility and solidarity among Allied nations,” Massarotto emphasized, noting that the deployment of Eurofighter Typhoons and the advanced E-550A CAEW has significantly bolstered NATO’s defensive capabilities.

As for all the previous air policing deployments, Italian Eurofighter Typhoons drawn from various wings across Italy, form the backbone of TFA operations. These aircraft – renowned for their advanced capabilities – are integral to the NATO Air Policing mission. “The Typhoon is Europe’s most advanced combat aircraft, constantly evolving with new technologies and armaments,” said the commander. Italy’s extensive experience with these aircraft has enabled seamless integration and standardization across NATO’s air forces. Mixed crews and shared training procedures further enhance interoperability, ensuring that TFA personnel can operate effectively in multinational teams. The Italian Air Force took advantage of the integration within the Task Force Air of the E-555A CAEW (Conformal Airborne Early Warning) into operations, which has marked a new era in NATO’s surveillance and battlefield management capabilities. “The CAEW aircraft initially contributed to EVA (Enhanced Vigilance Activity) operations to monitor the airspace over Northern Europe and Iceland and later joined patrol missions in the Baltic States. It is the most advanced multi-sensor system for airborne surveillance, command, control, and communications currently in service among European air forces. The AEW-BM&C (Airborne Early Warning, Battlefield Management & Communication) capability is now an essential tool for ensuring an adequate extension of national airspace surveillance capacity (Homeland Defence/Security),” the commander explained. Its deployment has significantly extended NATO’s ability to monitor and secure Baltic airspace, enhancing situational awareness and response times.

Lithuania, as the host nation, provides invaluable civil and military support to NATO forces stationed within its borders. This collaboration extends to joint training exercises that benefit both parties. The TFA commander expressed appreciation for Lithuania’s logistical and technical support,



This image epitomises the true meaning of NATO concept ‘Stronger together’ – two French Rafale B flying side by side with two Italian F-2000A

Italian AF F-2000A leading a four-ship formation composed of two French Rafale B and two Italian F-2000A

which has been instrumental in maintaining 24/7 operational readiness. Joint missions with Lithuanian assets have yielded significant training advantages, fostering mutual skill development and operational integration. "The partnership strengthens NATO's defensive posture while enhancing the professional capabilities of all participants," the commander stated.

NATO's commitment to standardized procedures ensures seamless co-operation among member states in the region. "We participated in several training events, including the NATO operation Neptune Strike 24-2, a series of advanced missions with Swedish colleagues operating the JAS 39 Gripen fighter jets (September 23-25, 2024), co-operation with the Lithuanian navy (ADEX), Close Air Support (CAS) activities in various NATO exercises in the Baltic States, such as exercise Furious Wolf," explained Massarotto. "These joint efforts underline the Alliance's determination to maintain security in a rapidly evolving geopolitical landscape."

During Neptune Strike 24-2 (October 24-31, 2024) Italy, with its Eurofighter Typhoons, played a leading role, significantly contributing to the air component of the operation. Numerous air co-operation activities were conducted in the Baltic Sea region and Eastern Europe, in co-ordination with naval and ground assets. These activities aimed to increase interoperability and standardization through highly realistic training scenarios focused on interception missions. The exercises took place in multinational Joint and Combined environments, involving fighter aircraft and personnel engaged in Air Policing missions or deployed across Europe, including

Below: ***A pair of Italian air force F-2000As. The Italian air force F-2000s will stay in Lithuania until end of March after completing block 66 and block 67 rotation in the Baltic region***

Below middle: ***An opposite break of two Italian AF F-2000s in the Baltic skies***

Below right: ***A close-up shot of two Italian AF F-2000s in a beautiful winter light***

*Above: **A Typhoon pilot poses for a shot at flight level FL100 (10,000ft)***

*Right: **Here's looking at you – Rafale B crews from above at FL100 (10,000ft)***

participants from the United States, Finland, the United Kingdom, France, and, following its recent NATO accession, Sweden. Neptune Strike was not merely a military training exercise but a tangible demonstration of international co-operation. Armed Forces from various nations came together to refine their capabilities, expressing a strong commitment to reinforcing NATO's security framework in the Baltic states, enhancing allied forces' readiness, deterring aggression, and reaffirming the Alliance's dedication to the defence and protection of all its member states.

A few months before exercise Neptune Strike, the Italian detachment participated in exercise Furious Wolf, held in Estonia, Latvia, and Lithuania from August 19 to September 6, involving NATO countries in close air support manoeuvres. This exercise was a demonstration of international co-operation, bringing together armed forces from various nations to refine their capabilities. Specifically, air and ground forces had to co-ordinate precisely to manage diverse and often complex tactical situations in scenarios where air power supports and operates in symbiosis with land operations. During numerous sorties, air-to-air refuelling activities were also conducted with multinational assets, including the Airbus A330 MRTT aircraft. From air defence to intelligence, reconnaissance, surveillance, and air-to-ground attacks, the Eurofighters, as multirole Swing Role fighters, demonstrated their broad operational capabilities in the exercise scenarios. Italy concluded the exercise with over 40 flight hours across approximately 30 day and night sorties.

Since August, and at the time of *AFM*'s visit to Lithuania (early December 2024), the TFA has flown over 1,000 hours and conducted 300 sorties, including several dozen Alpha Scrambles to intercept and identify unauthorised aircraft. These missions have not only ensured airspace integrity but have also served as valuable training opportunities. "The experience gained through joint exercises and real-world operations has enhanced our crews' capabilities, preparing them for any scenario," the commander stated. Training missions blend air-to-air (A/A) and air-to-ground (A/G) exercises, with Lithuania's dedicated ranges enabling simulated armament deployments.

Looking to the future, the TFA commander emphasized the importance of continuing joint exercises and building on the operational successes achieved thus far. The integration of advanced technologies, such as the Litening V targeting pod for extended identification and tracking capabilities, further strengthens NATO's defensive framework. "We use the Litening V on all aircraft as a mission enhanced because it has the ability in the air-to-air profile to identify aircraft at long distances. Once the target aircraft is locked on using the radar or IRST, we can track it with the POD. With its cameras, we can observe the details of the intercepted aircraft without being detected, maintaining adequate distances," Massarotto explained.

France: Rafales to enhance the mission

From December 1, 2024, four French Air Force Rafale B from Escadron de Chasse 2/4 'La Fayette' – Saint Dizier Air Base – augmented the Italian Eurofighters in Lithuania, providing NATO with an effective Air Policing capability. France had participated in NATO Air Policing in the Baltic region since 2007; this deployment marked the third consecutive year that the French Air and Space Force has deployed to the region. Mirage 2000-5 aircraft were stationed there in 2023, and Rafale C jets were deployed in 2022. "It was a great pleasure for us to participate in this collective mission as a NATO nation," said Major 'Sanka', French Rafale Detachment Commander. "The integrity of the Baltic Sea area was important for European sovereignty, which is why France had been contributing regularly to its protection," he added.

The additional second detachment at Šiauliai allowed for more flexible operational planning of NATO Air Policing in the region. Deployed allies benefited from additional opportunities to conduct training with other regional air, ground, naval, and special forces, as well as practice Agile Combat Employments, further enhancing the skills, interoperability, and

An opposite break of two Italian air force F-2000As

resilience of our air forces. Over the next four months (until the end of March), the mission will be divided into 'hot' and 'cold' weeks. During 'hot' weeks, the French jets will maintain operational readiness, prepared to intercept any suspicious or unannounced flights near the airspace of the Baltic nations. In 'cold' weeks, the focus will shift to operational preparation, although the Rafale jets will remain on standby for potential real-world alerts if their allies face issues.

Renowned for its technological maturity, the Rafale has become more and more a crucial player in air policing. "The Rafale is a state-of-the-art aircraft with cutting-edge technology," Sanka said. "It allows us to achieve better performance, track targets from greater distances, and integrate easily into tactical networks. The ability to share information with allied forces makes the pilot's and crew's jobs easier and more efficient." The Rafale fleet includes both single-seater and twin-seater variants, each serving distinct roles. The twin-seater version at his first appearance for an Air Policing mission offers greater flexibility, allowing pilots to conduct both air-to-air and air-to-ground operations simultaneously. "The twin-seater model allows us to perform multiple tasks at the same time, such as air-to-air and air-to-ground missions. It's an extremely versatile platform for a wide range of missions," said Sanka.

International co-operation is at the heart of air policing missions and Sanka emphasised that while operational approaches among NATO nations are largely aligned, communication remains a critical challenge. "During the early stages of the Ukraine crisis in 2022, differences in communication protocols between countries made it difficult to co-ordinate efforts effectively. We had some difficulties communicating with other nations because we didn't always share the same communication protocols. But over time, we have developed a better understanding, and now it's much easier to work together."

The training and co-ordination between nations are also vital components of air policing success. The French Air Force works closely with the Italian Air Force, ensuring that both forces are fully prepared to operate together in the Baltic region. "We are working closely with the Italians, and we make sure that both teams train together, so when it's time to conduct operations, everyone is on the same page," said Sanka. A careful balance of 'hot' and 'cold' training periods allows both teams to train alongside one another, ensuring that all personnel, regardless of nationality, are ready to work as a unified force when the need arises.

Since this is the first Air Policing mission for the Rafale B, logistics played a pivotal role in the successful execution of air policing missions. Sanka explained that the French Air Force has learned valuable lessons from previous deployments, especially when it comes to integrating mission operations and communication systems. "Deploying large numbers of personnel and aircraft to foreign locations requires meticulous planning and co-ordination. The integration of mission operations and communication was a challenge at first," he said. "When we first deployed here, we didn't have the best methods for communicating with NATO forces. But over time, we've developed more efficient and secure communication systems, which has made a huge difference in the success of our missions."

By maintaining a strong presence in the region – like Italy – France demonstrates its dedication to NATO's collective defence principles and reaffirms its role as a key player in the alliance's defence strategy. "For France, air policing in the Baltic is essential. It's about European security, and it's important for us to show that we are committed to these issues. We are here every year, ensuring that we uphold our national mission while contributing to NATO's collective security," Sanka emphasized. The four Rafale B from Saint Dizier were due to be replaced at the end of January by four Rafale from BA118 Mont-de-Marsan which were due to stay until the end of 67th rotation – at the end of March 2025. **afm**

Italian AF F-2000A leading a four-ship formation composed of two French Rafale B and two Italian F-2000A

Year of the Snake

The latest iteration of Cobra Warrior exercise began on February 25. **Ben Stanley Hall** went to RAF Waddington, the hub of the exercise, to find out more

Since morphing from the Combined Qualified Weapons Instructor (CQWI) Course in 2015, Cobra Warrior has become the largest exercise organised by the RAF. The first mission in this year's event saw aircraft from NATO allies France and Turkey, as well as Saudi Arabia taking part. The exercise is designed to train participants in high intensity, large force, tactical air war fighting operations, while testing out enabling capabilities. Exercise Cobra Warrior 25-1 (CW25-1) will run between February 24 to March 14 with over 50 aircraft taking part from various locations throughout the UK such as RAF Lossiemouth, RAF Brize Norton, RAF Coningsby, RAF Leeming, and RAF Waddington. The exercise is controlled by directing staff from the latter base.

Participants

The fighting force for CW25-1 at RAF Waddington consists of six Royal Saudi Air Force (RSAF) F-15SA Eagles from 6 Squadron, based at King Khalid Air Base, Khamis Mushait. Also at Waddington were three Turkish Air Force (TuAF) F-16C/Ds Fighting Falcons from 152 Filo, based at Incirlik Air Base, Adana, and a trio of French Air and Space Force (FASF) Rafale Bs from EC 1/4 'Gascogne', based at BA113 Saint-Dizier/Robinson, though the French contingent only took part in the first week of operations.

A quartet of RSAF F-15SAs travel up Delta taxiway as Tiger flight

92-0022, a TuAF F-16D, powers out of RAF Waddington's runway 20 on a CW25-1 mission

308
RAFALE
ARMÉE DE L'AIR
& DE L'ESPACE

The crew of this FASF Dassault Rafale B, 308, head towards their mount for their first mission of CW25-1 *All images Ben Stanley Hall*

Rooster21 flight, holding to depart Waddington on a pre-Cobra Warrior mission. All three of the Rafales hailed from EC 1/4 Gascogne, but it seems crews from EC 2/4 La Fayette also took part

The RSAF F-15SA is powered by a pair of General Electric F110-GE-129 engines, each outputting 29,500 lb st of thrust, as can be seen here

A line up of the six Saudi aircraft before the initial CW25-1 mission

The TuAF F-16s that took part in CW25-1 are block 40 aircraft hailing from 152 Filo 'Akinci'

The RSAF Eagles being part of the 'Advanced Eagle' family which included the USAF F-15EX and Qatari F-15QA. One of the distinctive features is the AN/AAS-42 'Tiger Eyes' IRST mounted on the targeting pod pylon below the engine intakes

As well as the aircraft based at Waddington, the FASF also had one of its A330 MRTT Phénix tanker aircraft from ERVTS 02/031, home based at BA125 Istres/Le Tubé, stationed at RAF Brize Norton. It and one of the RAF's Voyager tankers, would provide fuel support for the exercise. Operating from their home base of Landivisiau were the French Navy's Rafale Ms as well as the NATO E-3A Sentry from Geilenkirchen, Germany.

Also participating in CW25-1 are the RAF's Typhoon FGR4 force from RAF Coningsby and RAF Lossiemouth as well as support from the transport fleet of A400M Atlas and C-17 Globemaster III aircraft. The final players would be drawn from Joint Helicopter Command and would consist of Chinook helicopters from RAF Odiham but operating from other bases such as RAF Leeming.

Exercise Plan

The Exercise is broadly run over three weeks with larger Combined Air Operations (COMAO) happening every other day and the days in between used for planning. A total of 12 missions gradually became more complex as the exercise progresses. The first was solely an air-to-air exercise between Blue (Allies) and Red (Enemy) Forces. Further into the exercise, in week two, Offensive Counter Air (OCA) and surface attack missions will be implemented before the final week, which will cover dynamic targeting, personnel recovery and long-range air interdiction strikes.

Most of the missions take place over the North Sea, within the D514 training complex, located off the Northumberland coast. This is an area roughly 160 miles long by 80 miles wide, from about 8,000 to 60,000ft. This area is reserved solely for exercise participants for the duration. The Red Forces begin their missions from the west, while the Blue Forces start in the East.

Draken Europe is an active participant, utilising their L-159E Honey Badgers and Falcon 20Es from Teesside International Airport. The Honey Badgers will provide additional Red Forces while the Falcons will act as specialised Electronic Warfare obstacles for the Blue Force to tackle.

Ground-Based Air Defence (GBAD) systems are provided by RAF Spadeadam, with a mix of real and simulated systems, including Soviet-era SA-6 *Gainful* and SA-8 *Gecko* Surface to Air Missile (SAM) systems. When asked if these would be stationary or mobile, Group Captain Jim Calvert, exercise director for Cobra Warrior said: "We are very lucky to have private landowners who allow us to place our GBAD systems on their land. We like to use different locations at different times to keep the pilots on their toes." **afm**

The French crew of Rooster 22 acknowledges the large crowd of spotters along the fence line at RAF Waddington

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Firsts at

Concluding *AFM's* celebration marking the 40th anniversary of the Royal International Air Tattoo at RAF Fairford. **Ben Stanley Hall** looks at some of the most notable debuts at the world's greatest military airshow

An aerial shot of the E-4B shows the size and scale of this classic 1970s-built aircraft *All images Glenn Stanley unless stated*

After the heady days of the early 1990s, the falling of the Iron Curtain allowed many East European aircraft to make an appearance at airshows. Nevertheless, the following years were more about firsts for Western technology, such as the pan-European Eurofighter 2000, the stealthy B-2A Spirit and the revolutionary MV-22 Osprey.

1995 – First UK public appearance of the Eurofighter 2000

The finale of the Victory Show parade, which celebrated the 50th anniversary of World War Two, may be the lasting image from the 1995 event, but another major milestone was the debut of the Eurofighter 2000.

Tim Prince reflected on the importance of the occasion: “The year of the Victory Airshow at the Air Tattoo was a huge theatrical production to reflect the end of World War Two. By comparison, John Turner's routine in Eurofighter 2000 DA2, ZH558, operating out of BAe Warton each day, was, by necessity, relatively tame. Nevertheless, it was an important moment for us all.”

Ben Dunnell, the current lead commentator at RIAT, echoed Tim's sentiments: “Of all my choices for this list, the Eurofighter 2000's British public debut was the least spectacular. It gave just a few flypasts and didn't even land at Fairford. But this was the first chance for a UK audience to see the most important new RAF combat aircraft since the Tornado, so it has to be included here.”

1997 – First UK landing of the USAF B-2A Spirit

In 1997, the USAF's premier stealth bomber, the B-2A Spirit, 89-0127 *Spirit of Kansas*, made history by making the type's first landing on UK soil. These days, appearances of Northrop

Fairford

Pt 2

Grumman's flying wing bomber are a semi-regular occurrence, but back in 1997 the Spirit had only graced the UK shores with flypasts at Farnborough Airshow in 1996 (88-0332 *Spirit of Washington*) and 1997 at RAF Mildenhall's Air Fete (93-1086 *Spirit of Kitty Hawk*).

Tim Prince explained how it came about: "Our relationship with the Chief of Staff of the Air Force (CSAF) and the outer office in the Pentagon had, slowly but surely, become very strong over the years since the Air Tattoo had moved onto a DoD airfield back in 1973. In subsequent years, two retired CSAFs had taken honorary positions on our team as vice patrons. In 1997, having been allocated a flypast by a B-2A operating out of Whiteman without landing at Fairford, a few focused calls to the outer office suggesting that our patron, HRH the Duke of Kent, might welcome a closer look at the Spirit, seemed appropriate. It was a good move, as HRH was delighted, as were the Spirit crews. A 'fresh' crew had been sent over for the return leg, so both had an opportunity to enjoy the event while on the ground."

Ben Dunnell added: "The rumours were out that the B-2, which was intended to make

Compared to current Eurofighter displays, this was quite a tame affair. ZH588 arrived from the west, completed two 360° turns before a power climb out *Roger Leitch*

The unmistakable shape of the Spirit as it cuts across the Gloucestershire skies. After its flypast, the aircraft landed, refuelled and departed back to its homebase of Whiteman AFB, Missouri *Peter R March*

Moments before the iconic moment of the B-2A touching down on runway 09. This view shows off the curves of the Spirit, at complete odds with its angular planform view *Peter R March*

a couple of passes as it had at Mildenhall earlier in the USAF 50th anniversary season, might land at Fairford. Then we got the day's detailed flying programme and they were confirmed. The spectacle didn't disappoint."

2006 – First UK appearance of the USMC MV-22 Osprey

The first appearance of a V-22 Osprey in the UK had to wait 17 years after the type's maiden flight in 1989. While the tiltrotor design wasn't new, the Osprey was the first to enter military service, which it did in 2000 with the United States Marine Corps' Marine Medium Tiltrotor Training Squadron 204 (VMMT-204). The pair that made the type's debut hailed from Marine Operational Test and Evaluation Squadron Twenty Two (VMX-22).

Tim Prince said: "A few years before, we had held significant meetings with the manufacturer, its test pilots and engineers to ascertain the viability of participation by the Osprey. Interestingly, one development engineer was a Brit and had been through an ETPS engineers' course at Boscombe Down. Prior to the Osprey attending in 2006 there had been a lot of work by us all to ensure that it would comply with all the MOD/CAA/RIAT regulations. It was actually meant to debut at Cottesmore in 2000, but the visit was cancelled after an incident with the aircraft in the States in April of that year. It was another milestone event for us and was well received by everyone at Fairford."

Talking about the uniqueness of the aircraft, Ben Dunnell: "Tiltrotor aircraft were nothing new – Bell's XV-15 technology demonstrator had been around for years and Bell Boeing's production Osprey was almost two decades old by the time these USMC MV-22s made their British debut. Nevertheless, in a year that also witnessed the thrust-vectoring MiG-29M OVT putting on such spectacular routines, it was fascinating to watch another aircraft in a class of its own."

2008 – First appearance by the USAF F-22A Raptor

While 2008 was meant to mark the Raptor's European public debut, that was scuppered by the wet weather in the weeks preceding

Just about to land, this USAF F-22A Raptor was one of three that attended the cancelled 2008 show *Peter R March*

Shown here in its tiltrotor configuration, MV-22B, 166391, displays the versatility of the design *Peter R March*

The USMC Osprey, configured for landing, with its ramp down and its air refuelling receptacle extended *Peter R March*

6391
MV 22
MARINES
22

the show days. The F-22 did fly at Farnborough in 2008, but only on the trade days. The Raptors were back in 2010 to display in front of the public.

Describing what transpired in 2008, Tim Prince said: “Along with many others appearing for the first time in the UK, this was a disappointing time for the Raptor team, with the public weekend of RIAT 2008 cancelled, meaning they were only able to undertake a rehearsal/validation flight. Nevertheless, the rehearsal on the Friday afternoon in atrocious weather was described as ‘stunning’ by everyone who witnessed it.”

Ben Dunnell saw the rehearsal: “No-one who was at Fairford prior to the planned RIAT 2008 weekend will forget the experience. One reason was the appalling weather and the state of the ground. Another was the incredible performance of the F-22 during its rehearsals. Two years previously, the MiG-29 OVT had flown through the most amazing demonstrations of a vectored-thrust fighter, but with the Raptor we were seeing a production, in-service jet going through

A 1st FW Raptor starting to create its own weather with a tight turn on its practice display *Peter R March*

In 2010, a pair of Raptors from the 525th Fighter Squadron, based at Joint Base Elmendorf–Richardson, Alaska

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its paces, rather than a test aircraft. Very impressive indeed – perhaps even more so as the F-22 was enveloped in vapour under the dark skies on the Friday afternoon."

2016 – First UK appearance of the F-35 Lightning II

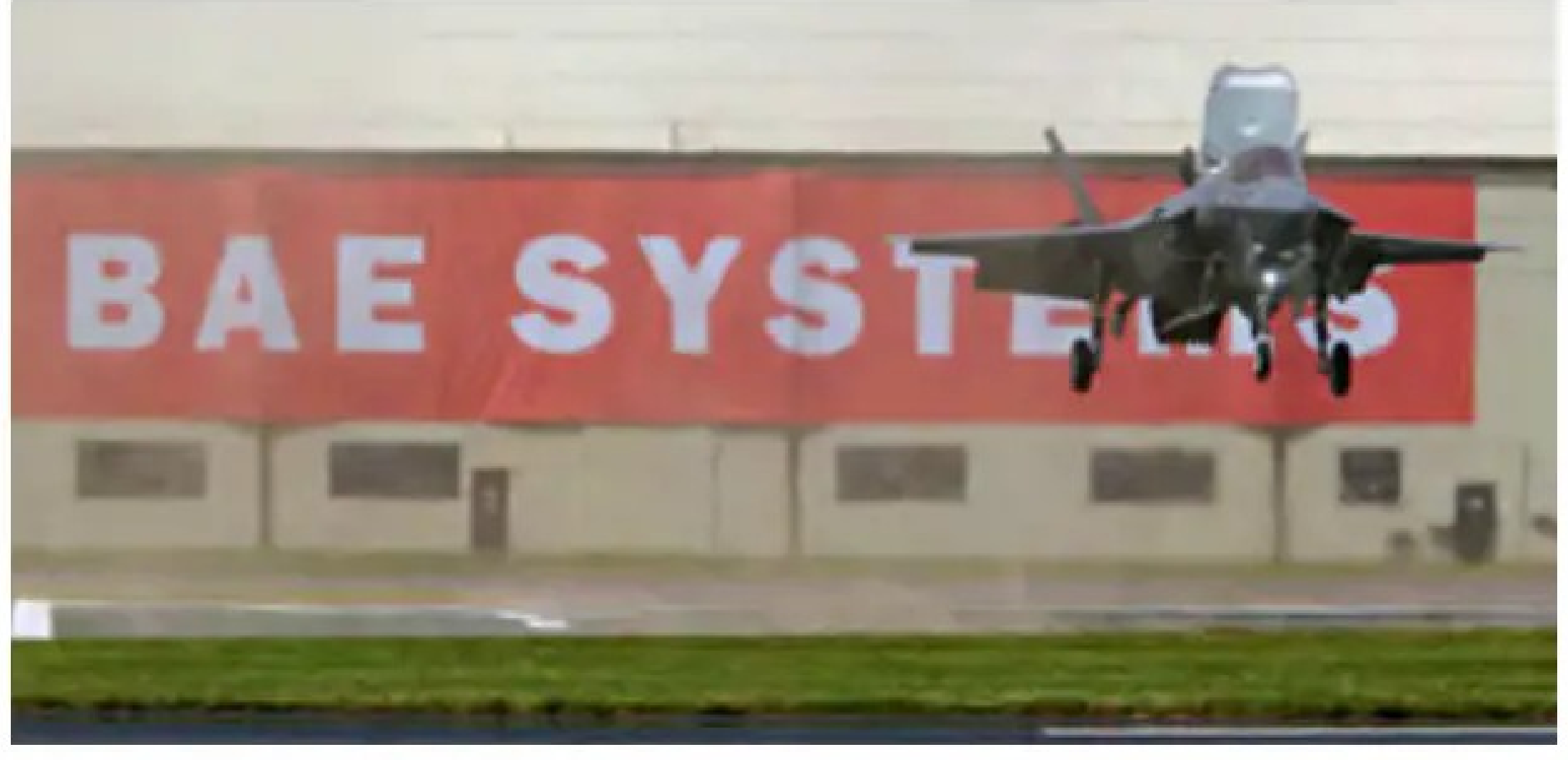
This was another debut that happened later than originally planned, as Tim Prince explained: "The planned F-35B displays by both RAF and US Marine pilots in 2014 were to be the highlight of the last RIAT with me at the helm. Lockheed Martin, the USMC, the RAF, the RN and the DoD F-35 Joint Program Office had been working with us for months to make it happen. Teams of pilots, engineers, PA folk and the like had been despatched from the US, exhibition structures had been built and copious quantities of air show handouts delivered, only to be thwarted at the eleventh hour by a grounding of all F-35s following a significant engine issue on the USAF's 'A' model. Not to be put off, the CEO of Lockheed Martin at the RIAT 2014 Gala Dinner that weekend made a promise that an F-35 would appear as soon as the issues had been resolved. She kept to her word, as we saw with the appearance of USMC and RAF F-35Bs in 2016."

There have been more exciting firsts over the years, but for significance with regards to the future of aerial warfare, the display by the F-35 probably tops the list. Ben Dunnell commented; "It may have been two years late, but the F-35's British debut was worth waiting for. Watching the rehearsal and validation flights by the RAF/Royal Navy and USMC F-35Bs was fascinating, not least because they used the temporary pads laid on the far side of the runway to enable the variant's vertical take-off performance to be illustrated. We had a first-time air-to-air refuelling demonstration by USMC KC-130J and F-35B – the Marine Corps' first ever participation in an Air Tattoo flying display, incredibly – and solo routines by both the British and American jets, as well as a unique formation of a UK jet with two Typhoons and the Red Arrows. It was a level of prominence befitting the significance of the F-35 to the future of air power."

2022 – First European show appearance by the USAF E-4B

On the face of it, the European debut of the E-4B Nightwatch might not seem all that significant or exciting compared to the arrival of Warsaw Pact types in the early 1990s or the stealthy aircraft in the years that followed. But anyone in attendance on that Friday afternoon will never forget the moment the 747-derived E-4B gracefully entered the Fairford circuit. The size of the aircraft grabbed the attention of all attendees as the so-called 'Doomsday plane' performed a fairly low flypast before landing on runway 27 and taxied into the static park.

Ben Dunnell said: "As a commentator, I always particularly enjoy opportunities to describe those showpieces that have never been seen before. Initially, the E-4B was scheduled to arrive on the Thursday before RIAT 2022 to take its place in the static display, but a delay would see it coming in at the close of Friday's flying programme, and thus afford the chance to present it to the crowd. And, of course, it wasn't just a straight-in approach, but an overhead break into a tight visual circuit. In mind was an interview I'd done with the great Reg Urschler, long-time P-51 Mustang warbird pilot, who had flown the E-4s, then newly upgraded to E-4B standard. He said it was 'the most impressive airplane I flew on active duty'. I thought the captain on this occasion probably felt the same." **afm**



USMC F-35B, 168727/'VM-19', performing a vertical landing and take off on a specially placed landing pad

USMC F-35B, 168727/'VM-19', performing a vertical landing and take off on a specially placed landing pad

Arriving at Fairford on the Friday allowed the public to witness the E-4B perform a flyby before breaking into the circuit

The USAF operates four of Nightwatch aircraft. When in action, it is known as the National Airborne Operations Center

RAF F-35B Lightning II, ZM137, the first RAF F-35 to visit the UK in 2016

Win RIAT tickets

In next month's *AirForces Monthly*, readers will have the opportunity to win a pair of tickets to RIAT 2025.

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Clash of the 5th Gen Titans

India's biennial AeroIndia airshow took place from February 10-14 at Yelahanka Air Force Station, Bengaluru. The highlights were of course the two 5th-generation fighters from the two airpower heavyweights - USA and Russia. Shrey Chopra was among the 40,000 or so people who enjoyed the face-off. **afm**

This was the first visit of a Sukhoi Su-57 to India, with it being pitched to the Indian Air Force as a prospective Fifth Generation fighter. The Su-57E '054' is United Aircraft Corporation's export version of the Sukhoi 57, and the offer is for them to be produced in India, like the Su-30MKI

Hindustan Aeronautics Limited (HAL) showcased its Intermediate Jet Trainer, the HJT-36, to both the Indian and foreign air forces. The aircraft will replace the HJT-16 Kiran Trainer as a Stage-II trainer for the Indian Air Force and the Indian Navy. The aircraft, initially named Sitara, had to be reworked to meet the requirements of the Indian Air Force. It was christened as Yashas, during the opening ceremony of AeroIndia 2025

Right: ***The Surya Kiran Aerobatic Display Team (SKAT) performed on all days of the show, carrying coloured smoke pods. The team flies the BAE Systems Hawk aircraft and are the ambassadors of the Indian Air Force***

Middle: ***LA-5021, a HAL LCA Mk. 1A development aircraft, takes to the skies for an air display. The aircraft, originally a HAL Light Combat Aircraft Mk.1, was converted to Mk. 1A, and is used to carry out testing and mods for the newer variant. The aircraft conducted an air display on all days, showcasing the aircraft's agility, and manoeuvrability to foreign forces present at the event. The Indian Air Force has two LCA squadrons at present***

Below: ***The Lockheed Martin F-35A went head-to-head with the Russian Sukhoi Su-57, with both competing as 5th-Gen fighter aircraft for the Indian Air Force. With the United States announcing a review of its policy on releasing fifth-gen fighters to India, and Sukhoi announcing support to build its fifth-gen fighter in India, either aircraft would help modernise the Indian Air Force***

Crowds gather to watch the most keenly awaited highlight of the show – the Sukhoi Su-57E air display, flown by Sukhoi Chief Test pilot Sergey Bogdan

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A USAF KC-135R Stratotanker, 59-1462, from Kadena Air Base, Japan, was one of the two USAF aircraft to conduct a flypast. Flying on two days in refuelling configuration, the aircraft was a part of the US contingent for the show, showcasing various air assets. The participation of the KC-135 came at a time where the Indian Air Force looks to modernise and replace its ageing IL-78 Tanker fleet, with the KC-135 being a possible contender

On June 14-15, the Spanish Air and Space Force's Patruilla Aguila will be celebrating 40 years since its foundation with an event at their home base of San Javier. The team will soon retire its venerable CASA C-101 Aviojets for its newly delivered Pilatus PC-21s *Ben Stanley Hall*

Airshows Incoming

Now that winter is behind us in the Northern Hemisphere, we can look forward to some aviation events and airshows. We have compiled a list of all the major European events for the upcoming year so you can start planning your trips.

May			
7-May	Beauvechain Air Base Day 2025	Beauvechain Air Base	Belgium
10-May	AirExpo 2025	Muret - Lherm	France
11-May	Rimini Air Show	Rimini	Italy
18-May	Desenzano del Garda Air Show	Desenzano del Garda, Brescia	Italy
24-25 May	Meeting National de l'Air	BA123 Orléans-Bricy	France
25-May	Grado Air Show	Grado, Gorizia	Italy
30 May / 01 Jun	Midlands Air Festival	Ragley Hall, Alcester, Warwickshire	UK
31 May / 01 Jun	Portes Ouvertes - 100 ans de la BAN d'Hyères	BAN Hyères, Toulon	France
June			
1-Jun	Kjeller Flydag 2025	Kjeller flypass, Skedsmo	Norway
1-Jun	Ladispoli airshow	Lungomare Marina di Palo, Ladispoli	Italy
05-07 Jun	France Air Expo - Salon de l'Aviation Générale Lyon	Lyon - Bron	France
07-08 Jun	Aviatická Pouť - Pardubice Aviation Fair	Pardubice Airport, Pardubice	Czech Republic
07-08 Jun	La Ferté-Alais Meeting Aérien: Le Temps des Hélices	Cerny - La Ferté-Alais	France
07-08 Jun	Estonian Aviation Days 2025	Eesti Lennundusmuuseum, Tartu	Estonia
8-Jun	RAF Cosford Air Show	RAF Cosford, Shropshire	UK
8-Jun	Punta Marina Air Show	Punta Marina, Ravenna	Italy
14-Jun	Abingdon Air & Country Show	Abingdon Airfield, Abingdon, Oxfordshire	UK
14-15 Jun	Kauhava Air Show 2025	Kauhava Airport, Kauhava	Finland
14-15 Jun	Festival letectva Piešťany	Piestany Airport, Piešťany	Slovakia
14-15 Jun	AIRE 25 - Patrulla Águila 40 años	San Javier, Murcia	Spain
16-22 Jun	Paris Air Show - Salon International de l'Aéronautique et de l'Espace du Bourget	Le Bourget	France
19-22 Jun	Kehler Flugtage	Flugplatz Kehl-Sundheim, Kehl	Germany
20-21 Jun	Antidotum Airshow Leszno 2025	Leszno-Strzyżewice, Leszno	Poland
21-22 Jun	Duxford Summer Air Show	Duxford, Cambridgeshire	UK
22-Jun	Porto San Giorgio Air Show	Porto San Giorgio, Fermo	Italy
28-Jun	Tag der Bundeswehr - Taktisches Luftwaffengeschwader 51	Fliegerhorst Schleswig-Jagel	Germany
28-Jun	Tag der Bundeswehr - Int. Hubschrauberausbildungszentrum	Bückeburg Air Base	Germany
28-29 Jun	Jesolo European Airshow	Jesolo, Venezia	Italy
29-Jun	Festival Aéreo de Motril	Playa Poniente, Motril, Granada	Spain
July			
5-Jul	Le Touquet International Sunset Airshow	Le Touquet–Elizabeth II Int'l Airport, Le Tourquet	France
05-06 Jul	Piotrków Fly Fest 2025	Aeroklub Ziemi Piotrkowskiej, Piotrków Trybunalski	Poland
05-06 Jul	Wales Airshow	Swansea Bay, Swansea	UK
05-06 Jul	Baltic International Airshow 2025	Spilve Aerodrome, Riga	Latvia
6-Jul	Lignano Air Show	Lignano Sabbiadoro, Udine	Italy
6-Jul	Roissy Meaux Airshow - Fête aérienne Meaux	Meaux - Esbly	France
6-Jul	Le Touquet Paris-Plage International Airshow	Le Touquet Paris-Plage	France
18-19 Jul	Wheels & Wings 2025	Falkenbergs Motorbana, Falkenberg	Sweden
18-20 Jul	Royal International Air Tattoo (RIAT)	RAF Fairford, Gloucestershire	UK
25-27 Jul	Festival Aéreo de Gijón	Playa San Lorenzo, Gijón	Spain
27-Jul	Ancona Air Show	Ancona	Italy

August

2-Aug	Bray Air Display 2025	Bray Seafront	Ireland
3-Aug	Messina Air Show	Messina	Italy
08-10 Aug	Flygfesten Dala-Järna 2025	Dala-Järna, Vansbro	Sweden
09-10 Aug	Blackpool Air Show 2025	Blackpool, Lancashire	UK
10-Aug	La Spezia Air Show	La Spezia	Italy
14-Aug	Rescue Zeeland 2025	Vlissingen	Netherlands
14-17 Aug	Airbourne: Eastbourne International Airshow	Eastbourne seafront, Sussex	UK
23-24 Aug	Roskilde Airshow	Roskilde Lufthavn, Roskilde	Denmark
29-30 Aug	Bucharest International Air Show (BIAS)	Aurel Vlaicu Int'l Airport, Bucharest-Baneasa	Romania
30-31 Aug	Southport Air Show	Southport Beach, Southport, Lancashire	UK
30-31 Aug	Radom Air Show	Radom-Sadkow AB	Poland
31-Aug	Barletta Air Show	Barletta, Barletta-Andria-Trani	Italy

September

05-06 Sep	Scottish International Ayr Show	The Low Green, Ayr, South Ayrshire	UK
05-07 Sep	Festival Aéreo Internacional Torre del Mar	Torre del Mar, Vélez-Málaga	Spain
06-07 Sep	Flugplatzfest Wershofen	Wershofen-Eifel, Wershofen	Germany
06-07 Sep	Paris Villaroche Air Legend	Melun - Villaroche	France
06-07 Sep	Frecce Tricolori 65th Anniversary Airshow	Rivolto Air Base, Udine	Italy
06-07 Sep	Duxford Battle of Britain Air Show	Duxford, Cambridgeshire	UK
06-07 Sep	Athens Flying Week 2025 - Tanagra Air Show	Tanagra Air Base, Athens	Greece
06-07 Sep	Letecké Dni Košického Kraja	Kosice	Slovakia
7-Sep	Telemark Airshow 2025	Notodden Airport, Tuven	Norway
7-Sep	Flügerchilbi Langenthal	Flugplatz Langenthal, Bleienbach	Switzerland
10-Sep	Guernsey Evening Air Display	St. Peter Port, Guernsey, Channel Islands	UK
11-Sep	Jersey International Air Display	St. Aubin's Bay, Jersey, Channel Islands	UK
13-14 Sep	Meeting Aérien de Roanne 2025	Roanne - Renaison, Saint Léger-sur-Roanne	France
13-14 Sep	Sanicole International Airshow	Vliegveld Leopoldsburg, Hechtel	Belgium
20-Sep	Thiene Air Show	Thiene, Vicenza	Italy
20-21 Sep	Festivolare - Aeroporto Trento Air Show	Aeroporto di Trento, Mezzocorona, Trento	Italy
20-21 Sep	Sivrihisar Hava Gösterileri (SHG Airshow)	Sivrihisar Air Park, Yeşilköy, Sivrihisar	Turkey
20-21 Sep	NATO Days in Ostrava & Czech Air Force Days	Ostrava Leoš Janáček Airport, Ostrava	Czech Republic
27-28 Sep	NATO Tiger Meet / Beja Air Show 2025	BA11 Beja	Portugal
27-28 Sep	Malta International Air Show	Malta Int'l Airport, Luqa	Malta

The first weekend of September is a busy one, with airshows in England, Scotland, France, Germany, Spain, Greece, Slovakia, Norway, Switzerland and Italy. The last of these is at Rivolto Air Base in Codroipo, to mark the 65th anniversary of the Italian Air Force's Frecce Tricolori *Ben Stanley Hall*

Final Report released into crash of a Canadian Chinook

The wreck of RCAF CH-147F Chinook 147310 being recovered after crashing into the Ottawa River on June 20, 2023 RCAF/Cpl Lindsay Jellicoe

A FINAL report into the loss of Royal Canadian Air Force/450 Tactical Helicopter Squadron CH-147F Chinook 147310 on June 20, 2023 (see *Attrition*, *AFM*, August 2023) was published by the Canadian Government Directorate of Flight Safety on December 2, 2024.

On the evening of June 19, 2023, the crew on board CH-147F 147310, callsign 'Hammer 31', was scheduled to conduct two advanced night tests as part of the Tactical First Officer Course. The flight was planned for a total of four hours, with each test taking two hours to complete. The two student pilots undergoing training conducted a crew change at the halfway point of the mission. The instructor pilot and the two flight engineers remained on board for the duration of the flight. The accident occurred during the second portion, shortly after the student pilots' crew change. Two pilots and two flight engineers were on board the aircraft at the time.

The accident crew departed from Final Approach and Take-Off Area 17 at Petawawa Airport, Ontario, to fly to confined area T40 in training area 'E'. Shortly after departure, the instructor pilot simulated an engine chip emergency, which required the aircraft to return for landing. After the emergency scenario was completed, the crew departed again from Final Approach and Take Off Area 17. During the turn towards confined area T40, the aircraft started to descend. While descending and still established in the left turn, the helicopter crashed into the Ottawa River near Garrison Petawawa with high energy.

The helicopter was destroyed. The two pilots were fatally injured in the accident while the two flight engineers successfully escaped the helicopter, receiving only minor injuries.

The investigation determined that when the crew initiated the turn towards area T40, the aircraft entered a constant descent. None of the crew members realised the height and/or rate of descent of the aircraft before impact, resulting in a Controlled Flight into Terrain (CFIT) accident. It was concluded that the unperceived acceleration and the environmental conditions that night were key factors in this accident, contributing to the spatial disorientation experienced by the crew.

The investigation made numerous recommendations to amend the CH-147F publications, including a recommendation to mandate the use of automation Level-3 (Native Mode Digital Automatic Flight Control System) when operating below 200ft above water at night. Additional recommendations were made to improve emergency response preparedness.

Holloman F-16 crash report released

USAF Headquarters Air Education and Training Command has released an aircraft accident investigation report into the loss of an F-16 Fighting Falcon on April 30, 2024 (see *Attrition*, *AFM*, July 2024). The report, released on February 5, identifies the aircraft as F-16C 87-0358 'LF' assigned to the 49th Wing at Holloman Air Force Base, New Mexico.

On April 30, 2024, at approximately 1144hrs local time, F-16C 87-0358 assigned to the 49th Wing, Holloman AFB, crashed six-and-a-half nautical miles southwest of the departure end of Runway 25. The flight was planned and authorised as a basic surface attack training mission within the local airspace. The weather was clear skies with unrestricted visibility and light winds out of the west. Thirty-six seconds after take-off, the mishap aircraft (MA) experienced an engine loss of thrust while at 1,030ft above ground level. The mishap pilot (MP) initiated corrective action procedures and, due to the low altitude and decreasing airspeed, the MP ejected 78 seconds after the engine loss of thrust. Shortly after the MP's ejection, the MA was destroyed upon impact within White Sands National Park, with a total loss valued at $21 million. The MP sustained only minor injuries and was recovered by an Army Air helicopter within minutes.

There were no relevant aircrew discrepancies or maintenance write-ups on the MA when flown the day prior and on the day of the accident, when normal prelaunch and launch procedures occurred. Local maintenance actions leading up to the mishap were conducted following applicable guidance, however local maintainers cannot access or inspect the fifth stage of the engine. The pilot was current, qualified, medically fit and performed appropriate actions. The scheduled mission was supervised correctly and released by pertinent authorities.

The Board President found, by a preponderance of the evidence, that the cause of the mishap was a misaligned, or turned, number ten position variable stator vane in the fifth stage of the MA Engine. Over time, the airflow disturbance from passing through the turned vane caused high cycle fatigue of a fifth stage compressor blade. The blade eventually separated during flight, causing additional engine damage and significant airflow disruption, resulting in an loss of thrust. There was insufficient evidence to determine the cause of the turned vane.

D: Sep 19, 2009
N: US Army/38th CAB
T: UH-60A
S: 79-23272

Updating the original report on this loss (*Attrition*, *AFM*, November 2009), the serial is given above. The helicopter was assigned to the 38th CAB, but the fatality, Spc Michael S Cote, was attached to the unit from A/1-52nd AVN. The Black Hawk crashed at approximately 2008hrs within the fenced perimeter of Joint Base Balad (Camp Anaconda), northeast of housing area H-7, after flying into a dust storm.

D: Oct 22, 2009
N: US Army/C/3-160th AVN
T: MH-60L
S: 92-26410

The serial number of the MH-60L which crashed on the USNS *Arctic* (T-AOE 8) off Fort Story, Virginia (see *Attrition*, *AFM*, December 2010), is given above. While soldiers were rappelling onto the deck, the helicopter's main rotors struck the exhaust stacks of the ship, then it fell 40ft on to the ship's deck and rolled onto its side.

D: Jun 21, 2010
N: US Army/C/5-101 AVN
T: UH-60L
S: 92-26448

Updating the previous report on this loss in Afghanistan (see *Attrition*, *AFM*, November 2010), the unit and serial are given above. The helicopter was lead in a flight of four undertaking an NVG assault mission in a low contrast environment with zero illumination. The Black Hawk descended from an altitude of 270ft at a rate of more than 1,000ft/minute for about ten seconds. The pilot applied collective too late, resulting in a hard landing at 0339hrs.

D: May 28, 2014
N: US Army/16th CAB
T: UH-60M Black Hawk
S: 09-20192

Updating the original report of the loss of an International Security Assistance Force helicopter in Afghanistan (see *Attrition*, *AFM*, July 2014), it was not a Chinook, but a UH-60M, as detailed above. It crashed in the Maruf district of Kandahar province at approximately 1130hrs. During approach at the helicopter landing zone, the crew initiated a go around due to a forming dust cloud. While initiating the climb, the main rotor RPM dropped, causing the UH-60M to move forward and down through the dust cloud and strike a cellphone tower. Investigation also determined that the ARF team had unbuckled their seatbelts prior to landing resulting in some being thrown from the helicopter on impact.

D: Mar 10, 2015
N: US Army/Louisiana Army National Guard/1-244th Assault Helicopter Battalion
T: UH-60M Black Hawk
S: 13-20624

The serial number of this Black Hawk, which crashed into the sea off the Florida Panhandle (see *Attrition*, *AFM*, May 2015), is given above.

D: Aug 25, 2017
N: US Army/3-160th SOAR
T: MH-60M Black Hawk
S: 05-20019

The identity of the Black Hawk which crashed in the sea off Yemen (see *Attrition*, *AFM*, October 2017) is given above.

D: Aug 20, 2018
N: US Army/1-160th SOAR
T: MH-60M Black Hawk
S: 10-20338

Adding to the original report of the loss of this helicopter in Iraq (see *Attrition*, *AFM*, October 2018), the identity of the MH-60M involved is given above. The helicopter experienced a dynamic roll-over on touchdown during a multi-ship brownout landing using NVGs in Sinjar, Nineveh province.

D: Dec 5, 2019
N: US Army/Minnesota Army National Guard/34th Combat Aviation Brigade/C Company/2-211 AVN (GSAB)
T: UH-60L Black Hawk
S: 84-23967

Updating the original report of the crash of this helicopter in Minnesota (see *Attrition*, *AFM*, February 2020), the identity of this UH-60L, not a UH-60A, is given above.

D: Jun 8, 2020
N: US Air Force/388th Fighter Wing
T: F-35A Lightning II
S: 17-5269 'HL'

Further updating our report on the rebuild of this aircraft using the nose section of 10-5015 'EG' (see *Attrition*, *AFM*, March 2025), the USAF have released additional details. The project was an interagency effort between the F-35 Joint Program Office, Ogden Air Logistics Complex, 388th Fighter Wing and Lockheed Martin. The so-called 'Franken-bird' completed the first of several successful post-rebuild check flights on January 16 at Hill AFB, Utah. It will also undergo final work on the section just behind its nose to apply low-observable materials. The aircraft is expected to be completed within eight weeks, with a projected return date of late March.

D: Nov 12, 2020
N: US Army/1st USASB AVN CO, Det 1
T: UH-60A Black Hawk
S: 85-24463

Updating the original report on the loss of this helicopter off the Egyptian coast (*Attrition*, *AFM*, January 2021), the serial of the helicopter is given above.

D: Mar 8, 2023
N: Indian Navy
T: HAL Dhruv Mk III
S: IN709

The identity of this helicopter, which made an emergency ditching close to the coast of Mumbai (see *Attrition*, *AFM*, May 2023) is given above.

D: Mar 29, 2023
N: US Army/Company C/6th-101st Aviation (Air Assault)
T: 2 x HH-60M
S: 15-20759 and 15-20767

Updating the previous report of the collision between these two helicopters (see *Attrition*, *AFM*, May 2023), their identities are given above.

D: Sep 2, 2024
N: Indian Coast Guard
T: HAL Dhruv Mk III
CG863

The identity of this helicopter, which ditched in the Arabia Sea near Gujarat (see *Attrition*, *AFM*, November 2024), is given above.

Wreckage of US Army/C/5-101 AVN UH-60L Black Hawk 92-26448 which crashed in Afghanistan on June 21, 2010
US Army

Attrition Report

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The wreckage of US Army/16th CAB UH-60M Black Hawk 09-20192 following its crash in Afghanistan on May 28, 2014 *US Army*

USAF 388th Fighter Wing F-35A Lightning II 17-5269 takes off from Hill AFB, Utah, on January 16 for its first functional check flight after a composite rebuild following its accident on June 8, 2020 *USAF/Todd Cromar*

D: Jan 29, 2025
N: US Army/Bravo Company/12th Aviation Battalion
T: VH-60M Black Hawk
S: 00-26860

The helicopter, callsign 'PAT 25', collided with PSA Airlines/American Eagle CRJ701ER N709PS flight JIA5342 from Wichita Dwight D Eisenhower National Airport, Kansas, in darkness on final approach to Washington-Ronald Reagan National Airport at approximately 2048hrs local time. Both the CRJ with 64 on board (four crew and 60 passengers) and the Black Hawk with three crew were destroyed when they fell into the Potomac River near the airport and all on board both aircraft were killed. The Black Hawk was operating from its base at Bravo Company, 12th Aviation Battalion, based at Davison Army Airfield, Fort Belvoir, Virginia. It was flying at low altitude and the crew were using night vision goggles and flying along Helicopter Route 4. The Black Hawk was reportedly at an altitude of about 375ft, while the CRJ was descending through 400ft. The crew comprised CW2 Andrew L Eaves (IP), SSGT Ryan O'Hara (CE) and CPT Rebecca M Lobach (PC).

D: Feb 2
N: Salvadorean Air Force
T: UH-1H Iroquois

While undertaking a firefighting mission, the helicopter was attempting to fill a Bambi bucket from Chanmico Lagoon, San Juan Opico, La Libertad, when it began losing height and plunged into the water. All four crew survived the crash.

D: Feb 2
N: Ukraine Air Force/831st Tactical Aviation Brigade
T: Su-27

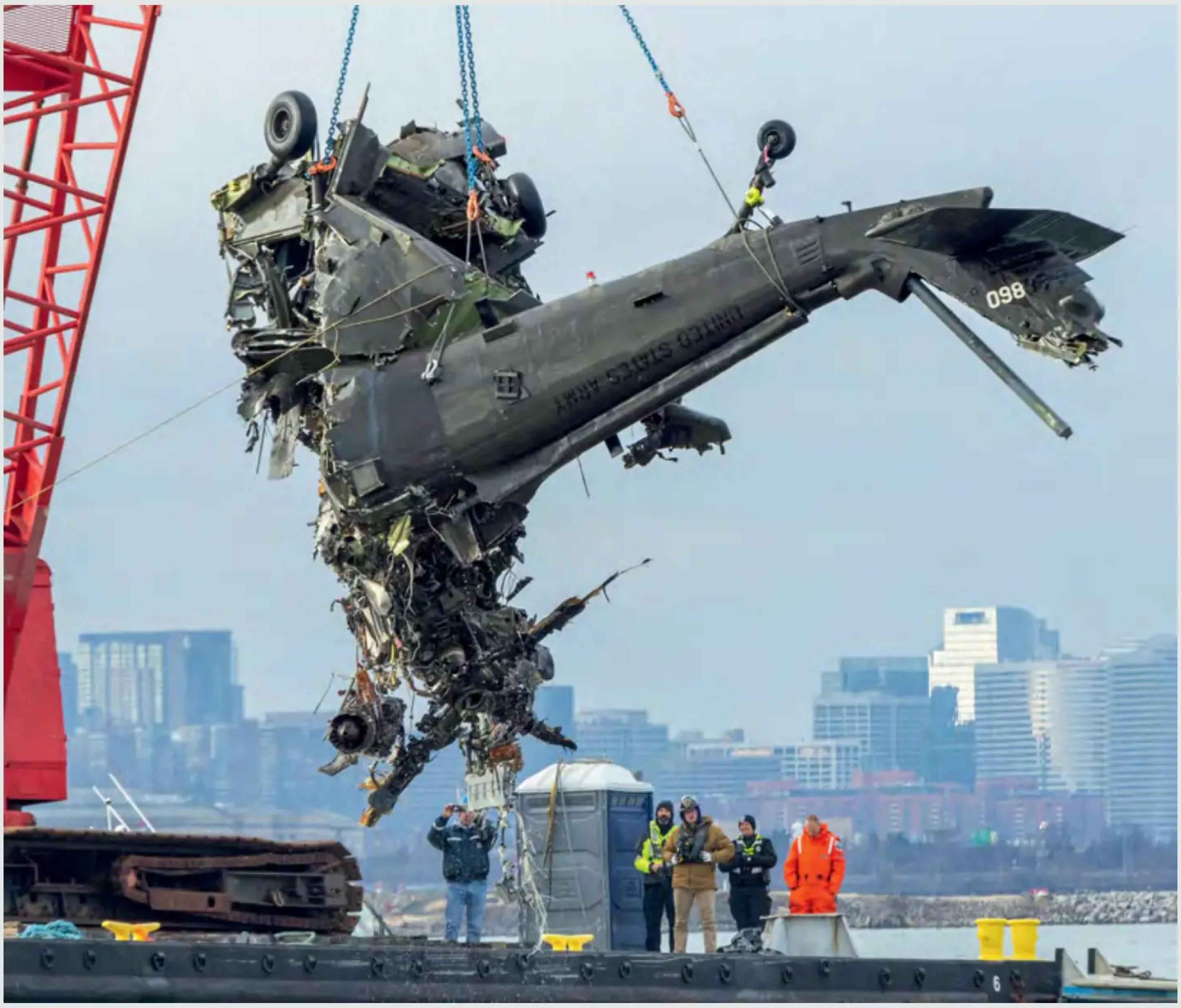
A Russian Naval Aviation Su-30M2 intercepted this aircraft over Ukraine, launching a long-range R-37M air-to-air missile which destroyed it. The pilot, Captain Ivan Bolotov, was killed. The weapon was reportedly launched from a distance of 130km.

D: Feb 4
N: Uruguayan Air Force
T: Cessna U206H Stationair
S: FAU[-712

After taxiing behind a Uruguayan Air Force CASA C-212 at Carrasco/General Cesáreo L. Berisso International Airport, this aircraft was blown onto its starboard wing and spun through 180°, sustaining substantial damage to its wings, undercarriage, propeller and engine. No injuries were reported.

D: Feb 6
N: Indian Air Force
T: Mirage 2000TH

During a routine training sortie from Gwalior-Maharajpur Air Force Station, the aircraft experienced a technical malfunction. Both pilots ejected safely before the aircraft was destroyed when it crashed at 1440hrs local time in an open



The wreckage of US Army/Bravo Company/12th Aviation Battalion VH-60M Black Hawk 00-26860 being recovered from the Potomac River after its collision with PSA Airlines/American Eagle CRJ701ER N709PS on January 29 *NTSB*

Spanish Army Air Mobile Force/BHELMA-III NH90 GSPA HT.29-02 'ET-802' lies on its side after crashing during an NVG training exercise on February 19 *via Twitter*

field near Sunari Chowki, Shivpuri, Madhya Pradesh. The crew sustained unspecified injuries.

D: Feb 6
N: Air Force of Zimbabwe/2 'Cobra' Squadron
T: K-8 Karakorum

This aircraft crashed five kilometres east of Guines Fowl, Gweru, during a training flight, killing the pilot, Air Lieutenant Tambudza.

D: Feb 8
N: Russian Air Force
T: Su-25 *Frogfoot*

Ukrainian forces of the 28th Mechanised Brigade shot down and destroyed this aircraft near Zaitsevo in the Bakhmut Raion of Donetsk Oblast, Ukraine, using a 9K38 Igla manpad. The pilot ejected safely and was picked up by an Mi-8 helicopter that was undertaking combat search and rescue duties.

D: Feb 12
N: US Navy/VAQ-135
T: EA-18G Growler
S: 166855 ' NL-520'

This aircraft was destroyed when it crashed in thick fog into San Diego Bay. California, at around 1015hrs local time. The aircraft was on approach to Naval Air Station North Island at the time of the crash. Both crew members ejected safely and were recovered by a fishing boat.

D: Feb 15
N: Republic of China Air Force/7th Tactical Fighter Group
T: AIDC AT-5 *Yung Yin* (*Brave Eagle*)
S: 1130

Following take-off from Taitung-Chin Hang Air Base on Taiwan's east coast for a weapons training exercise, the pilot, Major-in-Training Lin Wei, reported failure of both engines at 0840hrs local time and ejected safely before the aircraft plunged into the sea off the Dulan coastal area of Taitung County. This was the first loss of an AT-5 since the type entered service in 2021. Following the crash, the RoCAF grounded its AT-5 fleet pending further investigation.

D: Feb 19
N: Spanish Army Air Mobile Force (FAMET)/ BHELMA-III
T: NH90 GSPA
S: HT.29-02 'ET-802'

During a training exercise from its base at Logroño-Agoncillo using night vision goggles, the helicopter crashed and rolled onto its starboard side at approximately 2130hrs local time in a wooded area of Sierra de Cameros, near Torrecilla en Cameros, La Rioja. Only one of the four crew members was injured.

D: Feb 20
N: Ukrainian Air Force
T: MiG-29 *Fulcrum*

A Russian Air Force Su-30SM2 fired an air-to-air missile (reportedly either an R-73 or R-77) at this aircraft over northern Ukraine, causing substantial damage. The aircraft continued to fly for a short period of time before crashing after the pilot was forced to eject.

D: Feb 25
N: Sudanese Air Force
T: Antonov An-26

During a night take-off from Wadi Seidna Air Base for a flight to Port Sudan Airport, the aircraft developed a technical malfunction and was destroyed by fire after it crashed nearby in a residential area of the Al-Hara district 76, Karari, Omdurman, on the outskirts of Khartoum. All 17 on board were killed, along with a further 29 on the ground, while at least ten others were injured. Among those killed was Major General Bahr Ahmed, a senior commander in Khartoum.

Additional material from: Donny Chan, Scramble/Dutch Aviation Society and Asagiri Yohko.

The still smouldering remains of a Sudanese Air Force Antonov An-26 after its crash just after take-off from from Wadi Seidna Air Base on February 25 *Anadolu News Agency*

Next Issue

The H160's winch is fitted with an alarm that warns the operator when the load exceeds its lifting capability of 249kg (549lbs) *Henri-Pierre Grolleau*

Forerunner to the Cheetahs

The French Navy has successfully inducted into operational service state-of-the-art H160B helicopters that will allow aircrews and maintainers to build up experience until the advent of the H160M Guépard (Cheetah)

NEXT ISSUE

The March issue is on sale from April 17, 2025

• The Prince heads East

Alan Warnes talks to the commander of the *Prince of Wales* aircraft carrier's air wing, Captain Colin McGannity, which is set to leave on a mammoth seven-and-a-half-month tour to the Far East

• Pilatus's rugged workhorse

Babak Taghvaee reports on the Pilatus PC-6 Turbo Porter in military service. A total of 604 PC-6s in different variants were manufactured by Pilatus Aircraft in Switzerland and Fairchild-Hiller in the United States. Of these, 196 entered military service in 27 countries worldwide

• France on the defensive

AFM looks at how the French Air and Space Force is looking to the future and how it intends to defend its airbases in light of recent conflicts between Ukraine and Russia as well as Iran and Israel

Commander of the Prince of Wales aircraft carrier's air wing, Captain Colin McGannity *MOD/Crown Copyright*

The French Armée De Terre still operates five PC-6/B2-H4s from Montauban, southwest France *Babak Taghvaee*

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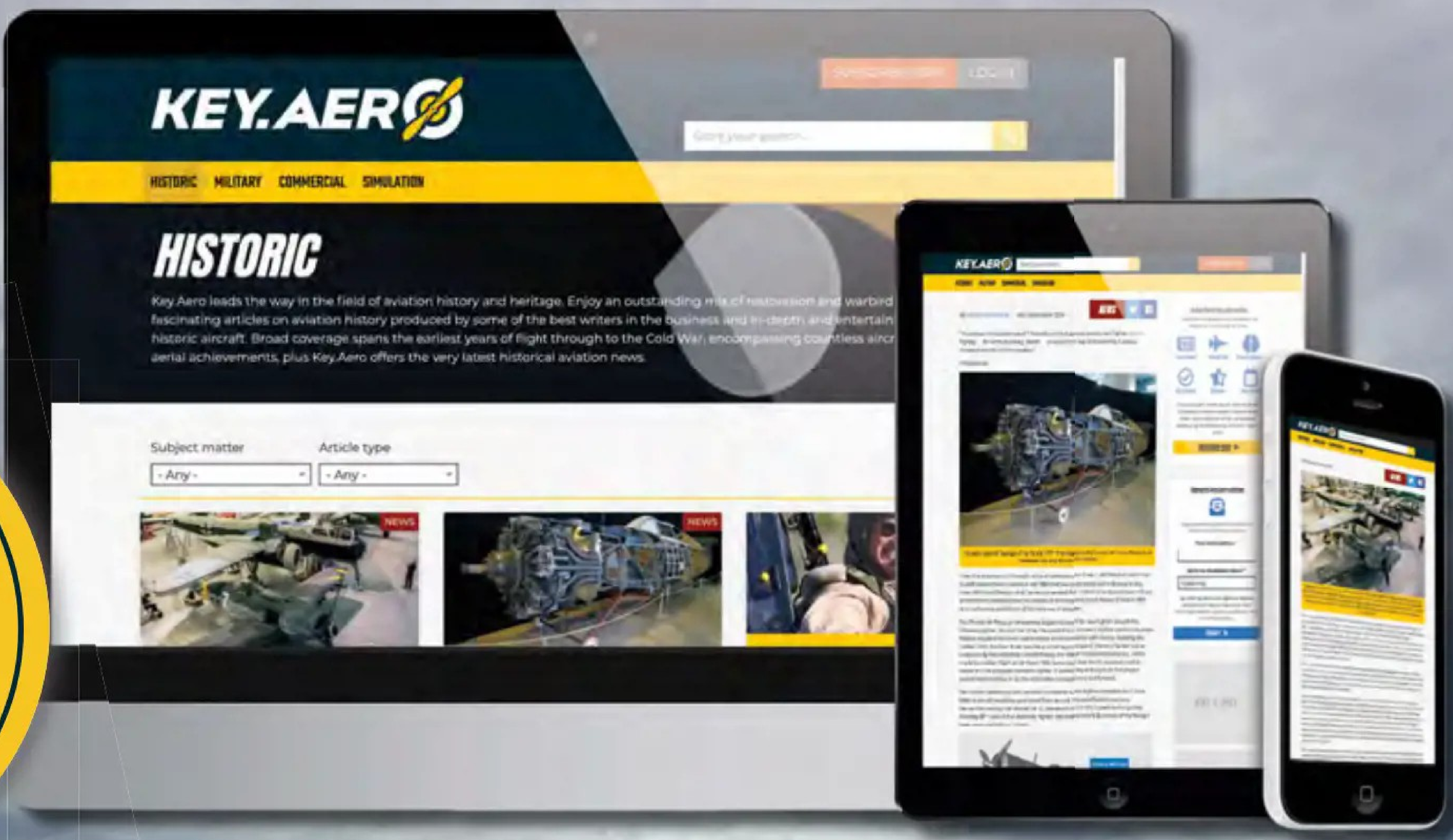
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